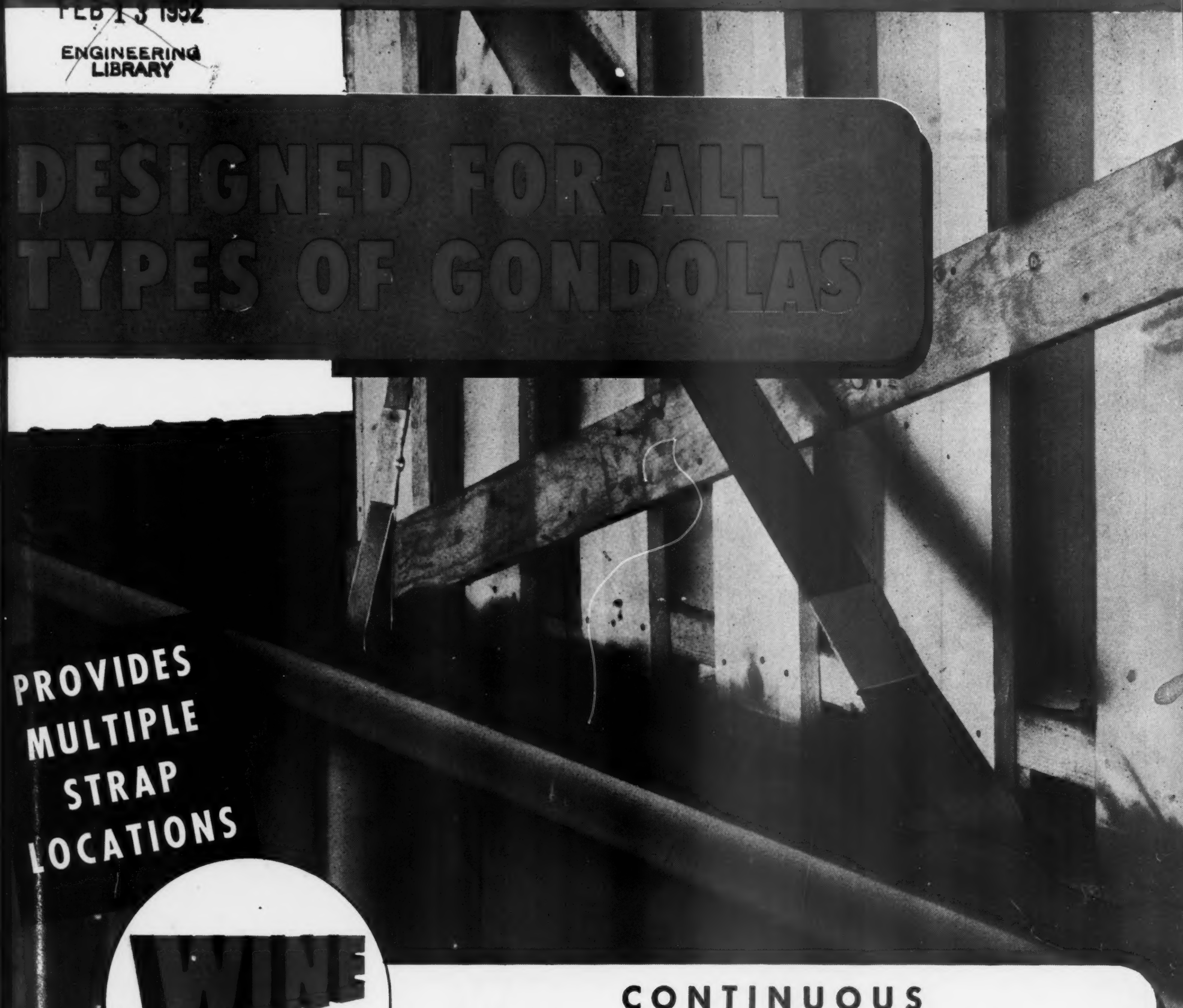
RAILWAY
Mechanical and Electrical Engineer

FEBRUARY, 1952



JANUARY, 1952

VOLUME 126

No. 1

RAILWAY Mechanical and Electrical Engineer

Founded in 1832 as the American Rail-Road Journal.

Editorial and Executive Offices: 30 Church street, New York 7, and 79 W. Monroe street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D.C.; Terminal Sales bldg., Portland 5, Ore.; 1127 Wilshire blvd., Los Angeles 17, Cal.; 1204 Russ bldg., San Francisco 4, Cal.; 2909 Maple avenue, Dallas 4, Tex.

Published monthly by Simmons-Boardman Publishing Corporation at Philadelphia, Pa. Subscriptions payable in advance. Postage free. United States, U. S. Possessions and Canada, 1 year $3. Other countries in Western Hemisphere: 1 year, $5. All other countries: 1 year, $7. 2-year subscriptions double the 1-year rate. Single copies 50 cents. Address Robert G. Lewis, Asst. to Pres., 30 Church street, New York 7.

The Railway Mechanical and Electrical Engineer is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulation (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. Printed in U. S. A.

MOTIVE POWER:

CAR:

QUESTIONS AND ANSWERS:

ELECTRICAL:

EDITORIALS:

NEW DEVICES:

PRINTED BY PERIODICAL PRESS CORP., PHILA. 23, PA.

RAILWAY Mechanical and
Electrical Engineer

Nickel Plate Moves Into New Calumet Terminal

On September 30 the New York, Chicago & St. Louis abandoned its old 93rd street, Chicago, engine terminal, built in 1882, and moved to a new terminal two miles south between 103rd and 110th street.

Built at a cost of approximately $2.8 million, the new terminal is designed for servicing freight and passenger steam locomotives and passenger and switcher diesel locomotives of both the Nickel Plates and the Chesapeake & Ohio. Since the Nickel Plate's main locomotive shop at Conneaut, Ohio, is thoroughly equipped to handle heavy repairs to both diesel and steam locomotives, it was not necessary to design the new Calumet terminal for making such repairs.

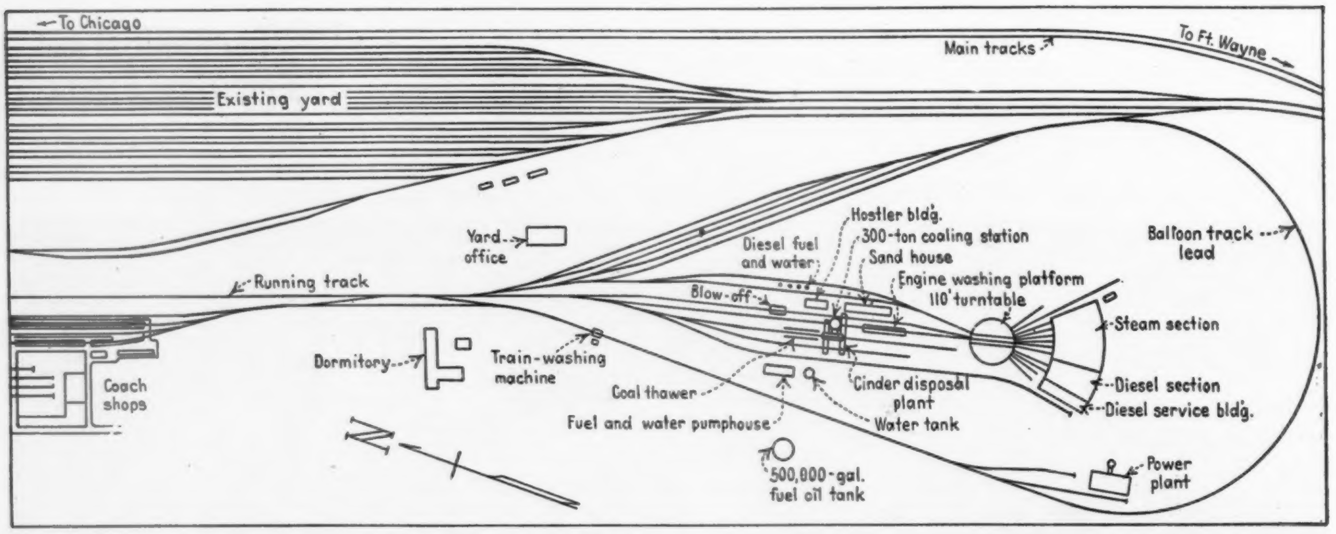
There is under construction a shop for the repair of passenger cars, a train and diesel locomotive washing facility, and a coach yard with related servicing facilities, which will add another $1 million to the cost of this project.

The new engine terminal is at the south end of the yard and is entered by locomotives from the north. After steam locomotives bring westbound trains into the yard, they are detached and move north to a running track, and then are run south on this track to enter the engine terminal. In the event that this running track should become blocked, the locomotives can be run south either over any one of 21 yard tracks or over the eastbound main track and then enter the terminal over a "balloon track" lead. The latter track loops around the engine terminal and will be used generally for turning passenger trains.

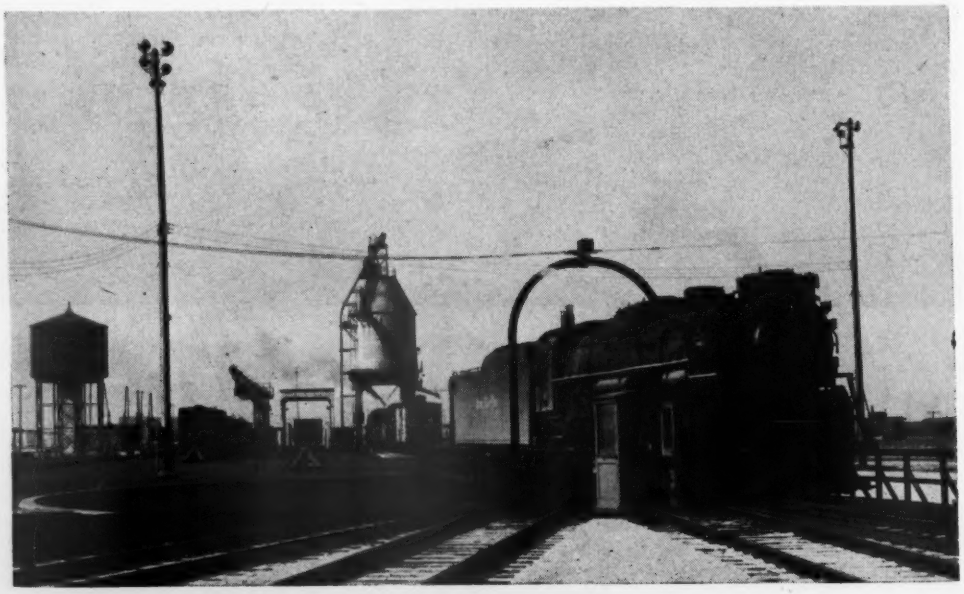
The enginehouse is divided by a brick fire wall into two sections—a steam section having six stalls, with tracks radiating from the turntable; and a diesel section with two radial tracks entering the building. Four other radial tracks were constructed outside of the building —a short wheel track and a longer material track serv-

CALUMET TERMINAL—DIESEL SHOP EQUIPMENT

21-in. by 84-in. engine lathe
21-in. drill press
10-in. dry grinder
18-in. grinder—to come
1½-in. pipe threader
D.C. electric welder
4 40-ton electric jacks
1 5-ton jib crane
1 2-ton jib crane
1 traveling crane
Complete socket wrench set and cabinet
Electric drills with ¼-in. and ½-in. chucks and with with ¾-in. converter
Electric power wrench for crab nuts
Main bearing wrench set complete
Valve grinder-to come
Honing tool
Shop truck and six trailers



▲ Layout of tracks and buildings of the Nickel Plate's new Calumet locomotive terminal near Chicago.



➤ The turntable is of the three-point-support continuous type and is 110 ft. long. Behind the locomotive can be seen the reinforced concrete coaling station and coal-car unloading canopy. Immediately to the left of these is the skip hoist of the cinder-handling plant, while at the extreme left is the 100,000-gal. water tank.

◄ Large unit heaters heat the diesel-shop section. One directs its heated air downward through an underfloor concrete duct for supplying warm air to the depressed floor level and inspection pits. Since no testing of the diesel engines is carried out within the shop, gravity-type roof ventilators are installed. Mechanical servicing of the Nickel Plate's steam 2-8-4's requires 45 to 50 min. on the average

ing the steam section, and two short tracks, for wheels and trucks, serving the diesel section.

The two-track diesel section is designed to care for the fourteen 1,000-hp. E.M.D. switching locomotives stationed at Calumet yard, of which not more than one is permitted to be out of service at any one time. Each month, 13 monthly inspections and a little more than one annual inspection of these locomotives are made at the shop. Since it requires seven days to complete an annual inspection and one to complete a monthly inspection, the shop is fully occupied for 20 working days. The other one or two working days in most months serve as a cushion for handling unexpected repair work.

Generally, all diesel lecomotives that enter the diesel section are worked on track No. 1, the most westerly of the two tracks. The rails of this track are carried on concrete walls, with the tops of rails 4 ft. above a depressed floor level and pit. This track has an elevated service platform on each side. Parallel with, and adjacent to, the westerly platform is a two-level service building. The second track, which is assigned for truck work, is flush with the floor and has a 94-ft. inspection pit. It is flanked on its east side by a machine shop area served by 5-ton and 2-ton jib cranes.

The diesel service building is 27 ft. wide by 128 ft. long and on its main level, which is at the same elevation as the elevated platforms, there are a first-aid room, separate offices for the shop foreman and his clerical staff, a parts-cleaning room, an oil room, and a parts store room. On the lower level are an electric shop and battery room, another spare parts store room, an oil-storage room, and two locker and wash rooms. Ramps connect the two levels with the shop floor level so that mechanized material-handling equipment can be used.

Steam radiation heat is used in the rooms of the service building, while large steam unit heaters heat the diesel shop section. One large unit heater directs heated air downward through an underfloor concrete duct supplying warm air to the depressed floor level and the inspection pits.

The heaviest work done on the diesel engine consists of the removal and honing of the liners and the working of the cylinder assemblies. The shop is not equipped to remove crankshafts nor to replace engines and main generators, this work being performed at major repair points. Body work consists of minor straightening only.

Truck work consists of a wheel changeout every two years, and a wheel and traction motor changeout every four years. When this is done the motors are replaced by rebuilt units. Flat spots on wheels and other minor tread defects are removed by emery shoes and high flanges are reduced by use of brake-shoe cutting heads. Truck changeouts are handled by lifting the entire locomotive with four 50-ton high-lift electric jacks.

Electrical work done in this shop includes renewing defective parts in the control cabinets, overhauling small motors up to rewind work, and annual high-potential testing of all electrical equipment.

Air and oil filters, cylinder heads and liners, and oil coolers are cleaned in the parts-cleaning room, which contains four cleaning tanks, one rinsing tank and a table to dry and oil the filters. Lubricating oil changes are made in accordance with chemical tests only, and not on the basis of time or mileage. When the oil is found by test to be no longer suitable for service, it is drained and sent away for reclamation.

Parts removed for reconditioning, with the exception of traction motors, are reapplied to the same unit from which they were removed. One completely equipped spare truck, including the two traction motors, is kept on hand. Oversize parts are never used. For example, a liner scored to a depth which will not hone out is scrapped.

The principal equipment in the shop is listed in the accompanying table. The 5-ton jib crane, which has a 12-ft. radius, is situated at the turntable end of the truck track for handling traction motor replacement. This crane lifts the traction motor from the locomotive truck and transfers it to a highway truck used for hauling it to the rebuilding concern. The 2-ton jib crane is mounted on the wall at the other end of the truck track and has a 15-ft. radius with an air hoist. It covers the lathe area but eventually will also serve a shaper and a planer planned for installation for handling locomotive and car department work. An I beam also spans the track for a traveling crane with a 2-ton air hoist for removing radiators, auxiliary generatorsfi and batteries.

In this era of intensive dieselization, the Nickel Plate continues to maintain steam power properly and efficiently. Mechanical servicing of the modern 2-8-4's, which haul all the road's high-speed freight, requires only 45 to 50 minutes on the average, and this is for a thorough servicing job. This, coupled with a first-class monthly inspection and boiler wash performed at Bellevue, Ohio, permits these locomotives to operate continuously at virtually 100 per cent availability throughout the remainder of the month, and with road failures practically unknown. Except during cold weather, each of the Nickel Plate's modern steam locomotives enters the enginehouse less than one trip in ten.

The steam section of the new Calumet enginehouse includes six stalls 128 ft. long radially. The roof has a high bay, 5 ft. long, which is equipped with smoke jacks and stacks. Each stall has an inspection pit 4 ft. deep and 105 ft. long, and two of the pits are served by a 40-ton Whiting electric drop table for handling tender wheels.

This section is heated through the inspection pits by unit heaters. Boiler washout facilities, together with steam, hot-water and compressed air connections, are provided along all tracks.

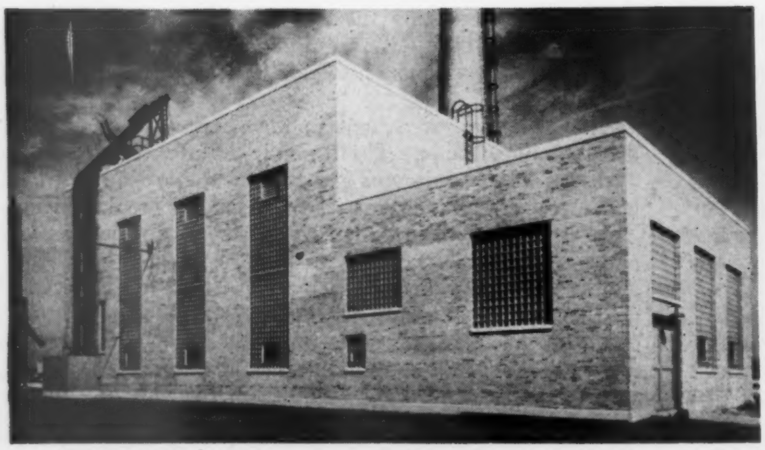
An average of 24 steam locomotives are serviced each day at Calumet. The servicing facilities are designed to expedite the work on locomotives backed into the inbound track, which is the normal position of the locomotives after bringing a westbound train into the yard. In the backed-up position the locomotives can take on sand and coal and have their ashpans cleaned in one stop. Moving forward to the washing platform, the engines take on water, are lubricated and boilers are blown.

On the outbound track, facilities are provided to enable steam locomotives to take on coal, sand and water, to have their ashpans cleaned and boilers blown, and to have train-control equipment tested.

The coaling station is of the cylindrical-bin type, built of reinforced concrete, and has an overhead storage capacity of 300 tons. Cars of coal are spotted by an electric car puller under a canopy over an unloading hopper. Coal is dropped from the car into the hopper and received by a skip, which is hoisted up a runway to the top of the bin where it is tripped. The bin is loaded at the rate of 40 tons an hour. The coaling station serves both the inbound and outbound tracks, discharging at the rate of 22 tons in 10 minutes.

Thawer for Coal Cars

An adjunct to the coaling station is a facility for thawing frozen coal in cars. It embodies two masonry walls, about 11 ft. high, 84 ft. long, and 1 ft. apart, which



The high bay of the new power plant houses the boiler room and the low bay the air compressor. The skip hoist at the left carries coal from a track hopper to a 100-ton capacity steel bunker on the roof. The radial brick chimney rises 175 ft. above the ground. The air compressor (below) is steam driven and has a piston displacement of 2,200 cu. ft. per min. The compressed air is cooled by passing it through an innercooler and an after-cooler, using city water as a coolant, before it goes to an outside air-receiving tank.

▲ The boiler room contains three 350-hp. water-tube boilers designed for a pressure of 200 p.s.i. and a working pressure of 150 p.s.i. Coal is conveyed from the overhead bunker to the stokers by a weigh-lorry, which is electrically operated, on the overhead runway in front of the boilers. The firing and combustion of the boilers, which have an average efficiency of 80 per cent, are automatically controlled.

serve as wind shields. The walls are constructed of concrete building blocks. Six oil-fired thawing pots, lined with firebrick, are installed between the walls in the center of the track, and the heat from these burners is directed upward by compressed air.

The cinder-handling plant is also mechanical in operation and has two loading skip buckets. There are three ash hoppers at this point, two on the inbound track and one on the outbound, so that one of the skip buckets serves two tracks. As locomotive ashpans are cleaned the ashes are dropped into one of the hoppers and into a skip bucket. The skip is actuated by a push-button control. As the skip moves away in a tunnel beneath the tracks, it automatically closes a gate at the bottom of the hopper and then travels in a runway to be tripped in an elevated position for unloading into a car. It then returns to its position under the hopper, opening the gate as it arrives, and takes on another load.

The water-treating plant is a one-story building which houses, in addition to a soda-ash treating system, a chemical storage room, a room for diesel-fuel oil pumps, a bridge and building shop, an office, and a motor-car room. Water is taken from the city main, treated, and pumped to a 100,000-gal. wood storage tank erected outside of the building on steel supports. Treated water from the tank is piped only to the steam locomotive water columns; untreated water is used at all other points.

Diesel fuel oil is unloaded from cars spotted on the oil track, where four unloading apparatuses have been installed, and pumped either to the 500,000-gal. steel storage tank about 200 ft. west of the building, or directly into the service lines leading to the fueling station placed between the two diesel servicing tracks, to the coal-car thawing pots, and to the sand-dryer house.

The sanding station consists of a sand dryer and storage house and two sand towers, one for servicing both the inbound and outbound steam locomotive service tracks and the other for serving both the diesel road engine track and the diesel-switcher track. An unusual feature of this sanding station is its storage capacity—1,000 tons—which is more than a six months' supply.

A small dolly on a narrow-gage track hauls the sand from the storage to the dryer room. The sand dryer is an oil-fired unit of the rotary type, and has a capacity for drying 3 tons an hour. It is set below the floor level of the storage house to facilitate dumping the sand from the dolly. The sand-elevating drum is set lower than the dryer so that at no time is it necessary for the sand to be handled manually except in loading the dolly.

Modern Power Plant

The power plant includes a boiler house, approximately 47 ft. by 111 ft.; a coal hopper and skip hoist; a fly-ash collector; a radial brick chimney 175 ft. high and 7 ft. inside diameter at the top; and an ash-handling system.

Coal for the power plant is taken from a pit under the coal-car track adjacent to the boiler house and conveyed by a skip hoist, having a capacity of 25 to 30 tons of coal an hour, to a 100-ton capacity overhead steel bunker inside of the boiler house. From the bunker the coal is conveyed to the stoker by a weigh-lorry,

(*Continued on page 58*)

Fig. 1—Journal-box assembly in the integral box type truck side frame equipped with proposed standard axle journal

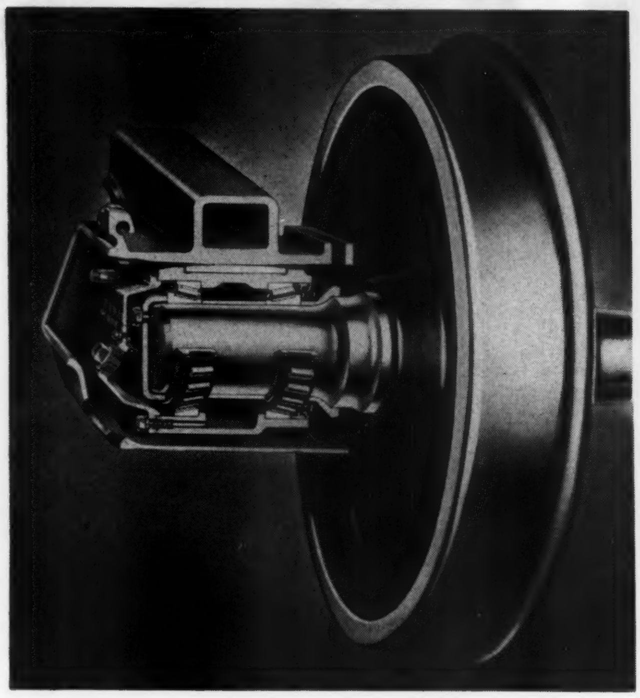


Fig. 2—Andrews type side frame with the same type cartridge journal box as shown in Fig. 1

Economics of Freight-Car Roller Bearings*

Fig. 3—Vulcan type frame with adapter between jaw opening and same type cartridge journal box as shown in Fig. 1

By Oscar J. Horger†

FOR some years it has been standard railroad practice to apply roller bearings to the axle journals of passenger cars and locomotives. This practice would have been extended to freight cars except for the doubt that existed in the minds of railroad officers as to the economics of roller bearings versus plain bearings on freight equipment. In fact, little data were available as to the operation and maintenance costs associated with the use of the plain bearings which increased the difficulties in making such an economic analysis. No analysis has heretofore been presented of the engineering requirements, costs, savings, and return on investment for roller bearings replacing plain bearings on all freight cars operating in interchange service. At the end of 1950 there was an ownership by Class I railroads of 1,744,625 cars plus an additional private ownership of 262,983 cars giving a total of 2,007,608 freight cars in interchange service.[1]

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* Part I of a paper presented by the Railroad Division, American Society of Mechanical Engineers, at the annual meeting, Atlantic City, N. J., November 28, 1951. Part II will appear in the February issue.

† Chief engineer, Railway Division, Timken Roller Bearing Company, Canton, Ohio.

[1] Statistics Car Building and Car Repairing for 1950, American Railway Car Institute, September 1951. These figures include caboose cars but not 25,357 cars owned by Class II, III, switching, and terminal railroads.

Fig. 4—Modified Vulcan frame for new cars using same type cartridge journal box as shown in Fig. 1

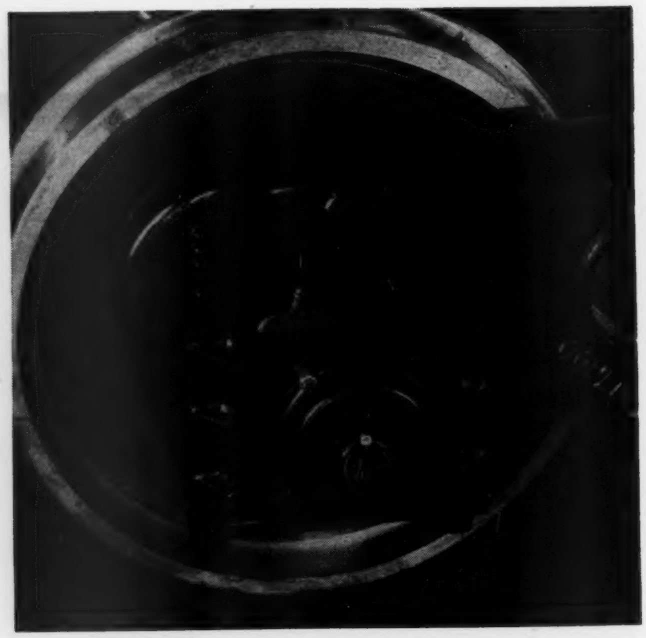


Fig. 5—Cartridge unit as shown in Fig. 1 in a pedestal type frame originally designed to receive a plain bearing passenger-car journal box

This is an economic study of the above problem and is submitted as a progress report. It is recognized that (a) such a complete bearing conversion program would require a substantial time period but ultimate investment returns are given here; (b) if individual railroads are to obtain the maximum benefits from roller bearings on system cars, which are off their lines a large percentage of the time, it is necessary that foreign cars received in interchange also have roller bearings; (c) some limited number of system cars on many railroads may generally operate in home territory or in routed interchange where many benefits of roller bearings could be obtained but this phase is not discussed here, and (d) the advantages must be sufficient to justify the joint action of all railroads in some progressive schedule of roller bearing application.

The analysis of this problem is divided into several major considerations so as to present an orderly development of this economic study as follows:

1. Only one design of journal box assembly for each axle capacity which will fit into any of the existing or new truck side frames. The axle journal to be standardized to receive the bearings of various manufacturers.
2. No bearing inspection or lubrication for three years in regular freight service at which time inspection will coincide with the required air brake inspection period.
3. Service performance data on journal bearings.
4. Cost factors associated with the maintenance and operation of both types of bearings and savings obtained.
5. Costs involved in the initial application of both types of bearings.
6. Return on investment.
7. Economic advantages of roller bearings not easily evaluated in dollars.
8. Conclusions.

Journal Design Conditions

Roller Bearing for Existing Cars. Practically all freight car trucks are now equipped with side frames of three general designs as to the method of attachment between the axle and frame: (a) integral box frame, (b) Andrews type, and (c) Vulcan type. It is intended that the same roller bearing cartridge journal box assembly[2] fit into any of these three designs as shown in Figs. 1, 2, and 3. A proposed standard design of axle journal is also shown in Fig. 1 which will receive any of the several types of roller bearings. Both the above axle and journal box designs will greatly simplify the maintenance of spare axle assemblies and stores stock.

The roller bearing journal, Fig. 1, on axles of various capacities may be machined from a worn plain bearing axle. Its diameter is $\frac{3}{16}$ in. above the condemning limit for the plain bearing journal on any axle size. Several years ago, fatigue tests were completed on full size members of this general design and the findings submitted to the Mechanical Division of the Association of American Railroads. On the basis of these tests approval was given to The Timken Roller Bearing Company for limited application of this axle to 5,000 cars until the roller bearing manufacturers could agree on a common journal geometry which would receive the bearings of various manufacturers.[3]

Roller Bearings for New Cars. In order to reduce initial costs on new cars and obtain the advantage of a quick wheel change feature, it is proposed that the same cartridge unit, used on existing trucks, Figs. 1, 2, and 3, also be applied as shown in Fig. 4. Here the end of the side frame has a jaw opening contour identical to the inside dimensions of the present integral box frame. The jaw opening in Fig. 4 is less than for the Vulcan frame in Fig. 3 so that no strength difficulties would be expected in meeting static and dynamic test requirements on side frames. Present price schedules indicate about $72 less per car[4] for the Vulcan than for the integral box frame. The quick wheel change feature on a plain bearing

[2] U.S. Patent 2,438,214, R. E. Horger, and others pending.

[3] The earlier design of this axle had a stepped journal of two different diameters instead of the uniform diameter in Fig. 1. The same journal fillet, axle diameter adjacent to fillet, and dust guard design on the stepped axle were used on the axle in Fig. 1. The critical design stresses are in this portion and the strength characteristics are not influenced by whether or not the diameter of the outer end of the journal is the same as that adjacent the journal fillet. Since this time the bearing manufacturers have agreeu on a common design of journal like Fig. 1.

[4] Based on 50-ton cars; this figure is over $66 for 40-ton cars and over $71 for 70-ton cars; for Vulcan frames and journal boxes this figure is over $73 for 40-ton cars and over $119 for 70-ton cars Actual costs may vary from scheduled prices.

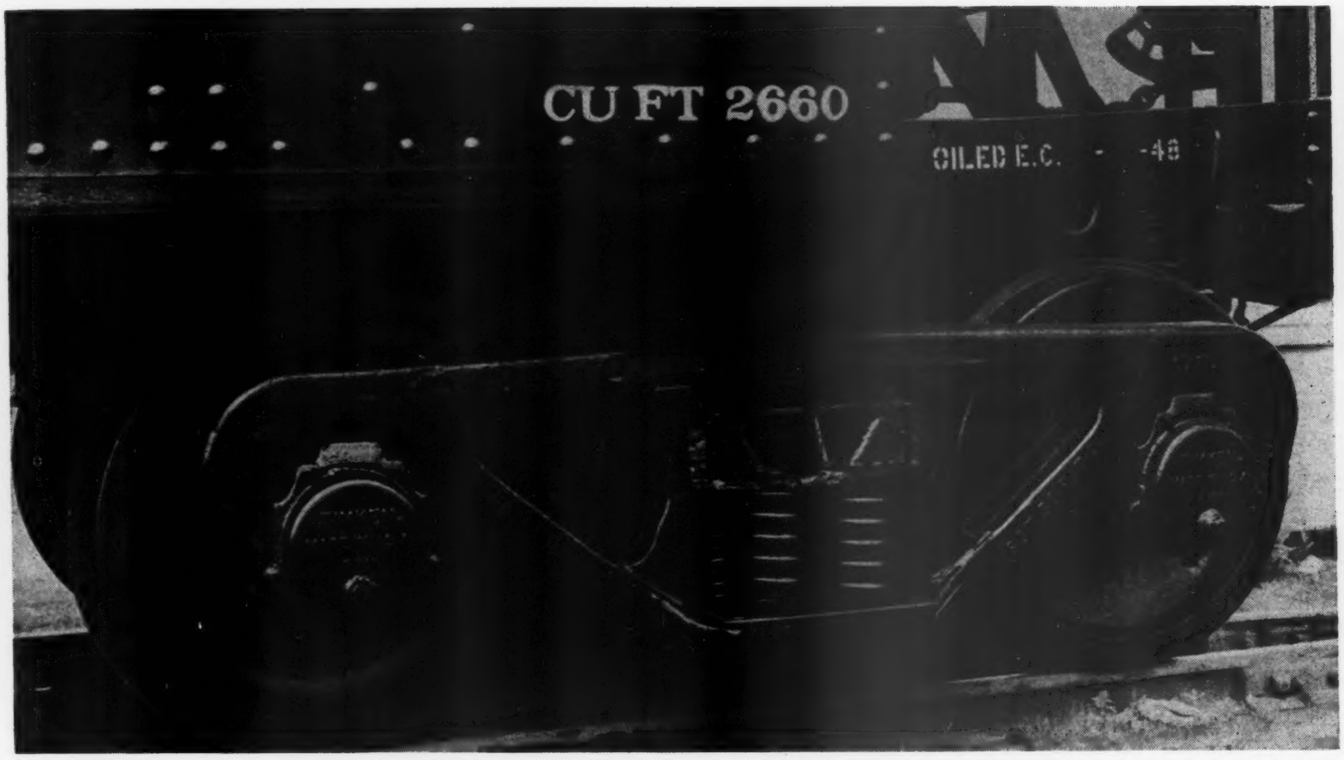


Fig. 6—A.A.R. pedestal type side frame with wide opening

truck using a Vulcan frame is only obtained at a premium of more than $83[4] above that for an integral box frame. This feature using the roller bearing, Fig. 4, is obtained at about $72 less per car[5] than for the construction in Fig. 1 which does not have the provisions for quick wheel change. An economic evaluation of this factor in changing wheels will be presented later in the paper. It is proposed that the A.A.R. Mechanical Division consider for standardization a frame jaw design similar to Fig. 4.

Freight car trucks have been designed around the conventional plain bearing journal box. There has been some consideration given to a redesign of the truck around the use of roller bearings so as to affect weight savings and lower costs. There are possibilities in this direction, but the interest along these lines has not been sufficiently aroused or intensive to promote the necessary engineering activity.

Roller Bearings for Other Cars. Another application of the same cartridge unit in Fig. 1 is illustrated in Fig. 5. Here the truck pedestal opening was designed to receive a plain bearing journal box used on passenger cars. A saddle member is interposed between the frame and box. A cost penalty is involved in the heavier frame jaw design and additional saddle member in Fig. 5 over Fig. 4, where the same journal box assembly is applied.

A.A.R. standards adopted in 1947 include the use of a pedestal type frame having a wide jaw opening[6] as shown in Fig. 6. The journal box assembly, frame jaw and axle journal are oversize considering operating requirements in ordinary freight service as compared with an adequate and less expensive design in Fig. 1 through Fig. 4.

Lubrication and Maintenance

The journal box in Fig. 1 is designed to operate on A.A.R. approved greases[7]. Great importance is attached to an adequate enclosure which will retain the lubricant and exclude foreign matter such as dirt, brine drippings, and water from entering the box. It is intended that this design will permit operation for a three year period in freight service without inspection of grease or making additions. Since periodical air brake inspection is scheduled every 36 months, then this work will coincide with the bearing lubrication period. This provision alone is the most important single factor responsible for immense economic savings presented later. It greatly reduces the large item of maintenance costs of plain bearings. It will also make many cars available for revenue service which are now on the repair track for bearing maintenance and periodical twelve month repack.

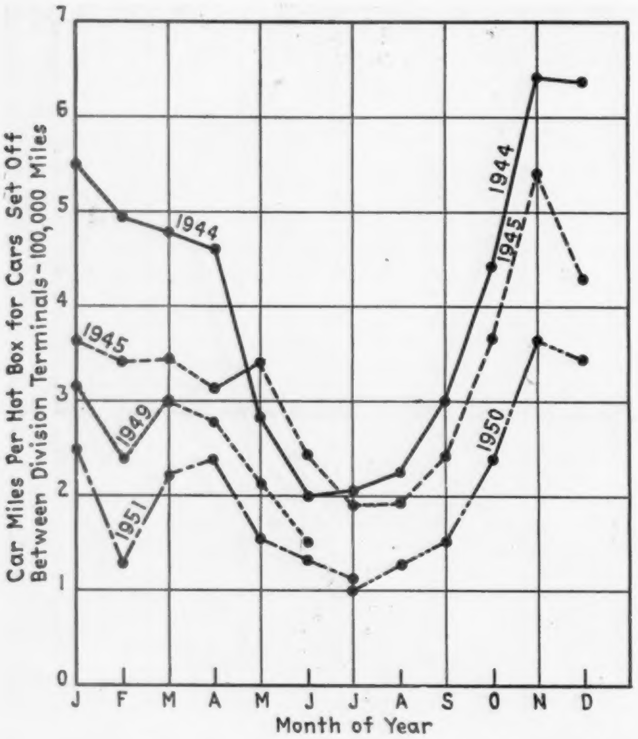
Grease will better protect the bearings than oil during periods of idleness. Also less leakage of grease will be experienced than oil. No moisture should be present in the box except that formed by condensation inside the box. The grease used has ample capacity for absorbing this small amount of moisture so it will not attack the bearing.

A unit seal assembly incorporating a rubbing type member of synthetic moulded material is applied at the rear of the box. It operates on a hardened steel sleeve ground to a 15 micro-inch maximum finish which makes it impossible to score or wear the axle. This enclosure is particularly effective in preventing contamination of the grease from fine particles of road dirt or dust from coal, cement or other kinds of lading carried in covered hopper cars. The journal box and wedge are die forgings of SAE 1035 and 1045 steel respectively. All these refinements contribute toward a long life in rugged service with three year lubrication periods.

Service Performance Data on Journal Bearings

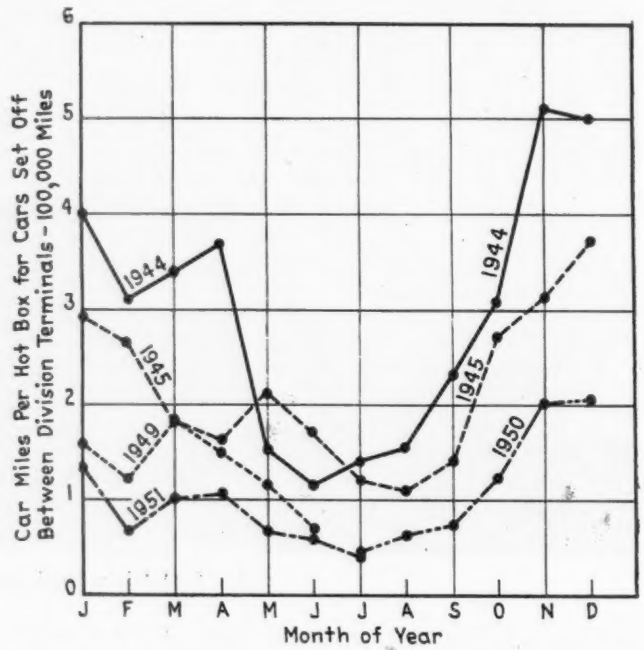
Cars Set Off Due to Hot Boxes. One measure in general use for showing bearing performance on freight cars is

[5] Based on 50-ton cars and assuming the price of the frame in Fig. 4 does not exceed that for the Vulcan frame in Fig. 3.
[6] Manual of Standard and Recommended Practice, D-12A-1948, Associated American Railroads, Chicago. Over 1,100 car sets of this design are in service.
[7] Code of Rules for the Interchange of Traffic, Supplement No. 2, 1950 Revision, p 4, rule 66-A, Associated American Railroads, Chicago.

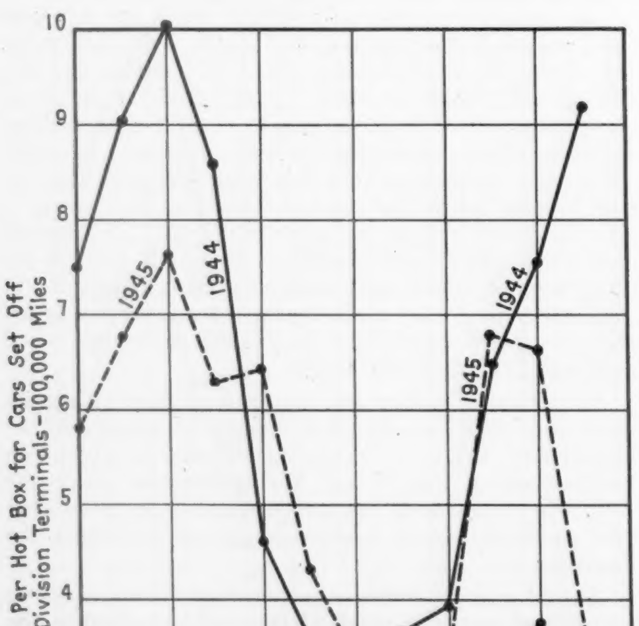


◄ Fig. 7—Plain bearing performance on freight cars of all Class I railroads

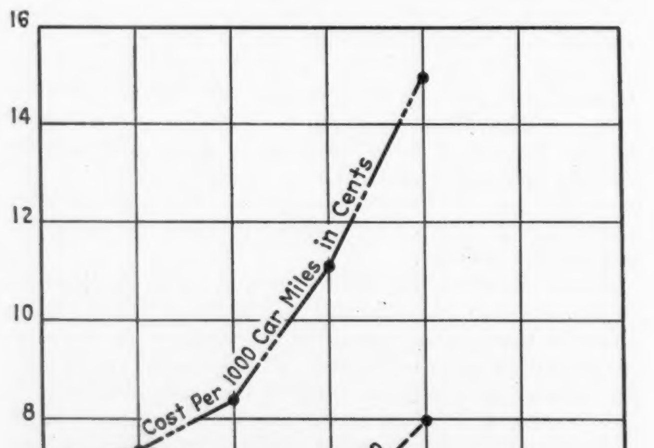
▼ Fig. 8—Plain bearing performance on freight cars on Railroad A



▼ Fig. 9—Plain bearing performance on freight cars on Railroad B



▼ Fig. 10—Reportable accidents to I.C.C. as a result of broken freight-car journals for all Class I railroads. Includes only the cost of repairs and clearing wreck



given by A.A.R. reports covering the car miles per hot box for cars set off between division terminals. A graph of this data[8] is plotted in Fig. 7 representing the average condition found with plain bearings on freight cars of all Class I railroads. A similar plot is shown for two large individual railroads[9] A and B in Fig. 8 and 9 which are typical of performance above and below the national average in Fig. 7; they do not represent the worst or the best operation. Two distinguishing characteristics are common to all these graphs in that (a) a continuous performance deterioration is occurring over the last several years, and (b) lower performance is marked in the hottest and coldest weather periods.

Some explanations which have been offered for the first item are (1) reduction in man-hours used in plain bearing journal box inspection due to 5 instead of 6 day work week and (2) the higher average speed of freight trains (stimulated by the increased use of diesel-electric locomotives) has led to serious wrecks from broken or burnt-off journals and on many railroads train crews have been made responsible with the result that more cars are set off rather than incur wrecks; with slower train speeds and frequent stops cars could be nursed into terminal.

Train movements have definitely changed in the last few years. Improved signal systems and operation of the same locomotive over several divisions, without fuel or water stops, gives cause for little delay and more continuous train operation. This is so marked that inspection forces complain of the lack of time allowed them at division points for the required plain bearing journal box inspection. Even the length of trains has increased so as to utilize the greater tractive effort of present day motive power so that it is more difficult to detect hot boxes.

Accidents Due to Broken Journals. The increasing seriousness of accidents from broken off plain bearing journals[10] is presented in Fig. 10. In 1950 it was costing an average of 14.9 cents per 1000 car miles which is more than double that in 1946. Furthermore, this cost only includes the items of repair to equipment and way and structures and clearing wreck; nothing is included for lading damage, detouring trains, train delays, injured and killed employees, etc. In this five year period four were killed and 86 injured in both freight and passenger train accidents due to broken journals, with most of the fatalities occurring in freight train service.

Few accidents have been reported on roller bearing axle journals on passenger cars, locomotives, or freight cars. Some roller bearing journals have burnt-off but no serious accidents have occurred. Some explanation may be offered for this; the end of the axle opposite the broken journal prevents the axle from getting out of the truck because the roller bearing completely surrounds this journal and tends to hold and stabilize the broken and fluttering end of the burnt-off journal in better truck alignment.

Performance Considering All Hot Boxes. Railroad C[10] obtained the mileage for cars set off between division terminals for hot boxes shown in Fig. 11 which is characteristic of that presented in Fig. 7-9. In addition, Railroad C also records the number of hot boxes which (a) cause train delay but where the car is not set off and (b) do not cause train delay but where it is necessary to change a brass or repack box[11]. A comparison of car mileage obtained from occurrences of Items (a) and (b) with that for set offs is given in Fig. 12 for one year of 1950. The lower curve in Fig. 12 is replotted in Fig. 13 along with similar curves for several other years. Much less change over the years is evident in Fig. 13 where all hot boxes are considered as contrasted with only the hot boxes causing set offs in Fig. 11. While Fig. 13 portrays the hot box record the car mileage shown would be still further reduced if the number of cars found without hot boxes but with cut journals, waste grabs and other kinds of defects requiring attention was included.

Journal packing is sometimes robbed from the box and in some localities this thievery reaches serious proportions. On one division of one railroad 100 cars were set off due to hot box condition during one year where the packing was found missing. This number represented 11 per cent of all cars set off.

Performance Considering All Bearing Defects. A still further criterion as to plain bearing performance can be found from a study of the number of axles removed from cars for cut journals alone and also the total number of cads having bearing defects.[12] Fig. 14 contains the results of such a study made from detailed records of two large railroads. For Railroad E[9] the average freight mileage was 98,000 car miles per pair of wheels removed for a cut journal as compared with 247,000 car miles per car set off between division terminals for a hot box and only 49,000 car miles per defective bearing; for Railroad F[9] this same comparison is 70,700, 121,000 and 45,000. It is interesting to observe that the car miles per bearing defect is very much the same (45,000 and 49,000) for these two roads even though car miles for cars set off and cut journals exhibit large variations.

Accurate data of the above character is not available without making a research into detail records. In view of the absence of more complete data, it was assumed in this economic study that all Class I railroads would have an average value of freight car miles for bearings and wheels as shown in Fig. 14. Here the values were selected from the known performance of Railroads E and F. Later the wheel performance values in Fig. 14 are used to evaluate the economics of a quick wheel change feature provided by roller bearings (Fig. 4).

Some railroads have a disproportionate and large percentage of hot boxes on cars in short haul traffic or which do not pass through points where journal boxes are serviced or on covered hoppers where the powdered nature of the lading contaminates the plain bearing assembly. In fact one railroad is currently applying roller bearings to over 1,000 pulpwood and covered hopper cars for these reasons.

Effect of Journal Load on Hot Boxes. Mitchell[13] obtained 115,000,000 car miles on the pacemaker freight cars operating in assigned service on the New York Central with nine recorded journal heatings of plain bearings over a certain period; over a later period 42,000,000 car miles were operated without a journal heating. He suggested several factors as affecting this performance which included reducing the capacity of the car from 50 to 25 tons whereas the actual average lading was only 12.5 tons. Other railroads have also obtained phenomenal plain bearing performance on some manifest or name freight trains where the average loading is low.

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[8] Publication of this data was interrupted from time to time but graphs show data issued for all loaded and empty cars, and both foreign and system cars.

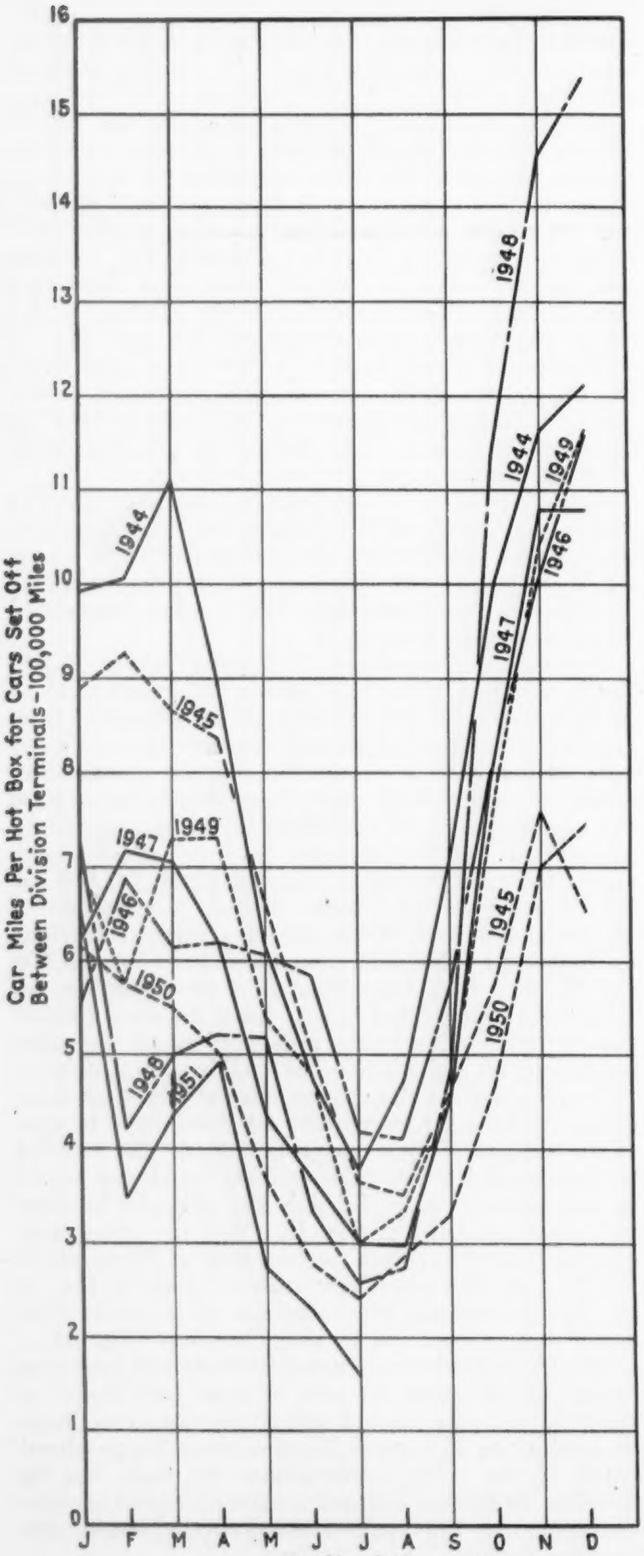
[9] Reference is made to individual railroads by letter throughout this paper because some of the railroads desired that their data be treated as confidential. Each of these railroads had over ¾ billion car-miles loaded and empty freight-car traffic.

[10] Data obtained from I.C.C. accident reports, code numbers 2419, 2420, and 2421 for broken journals on freight cars. These accounts only include accidents where costs exceeded $150 for years 1946 and 1947, $250 for 1948, and $275 for 1949 and 1950.

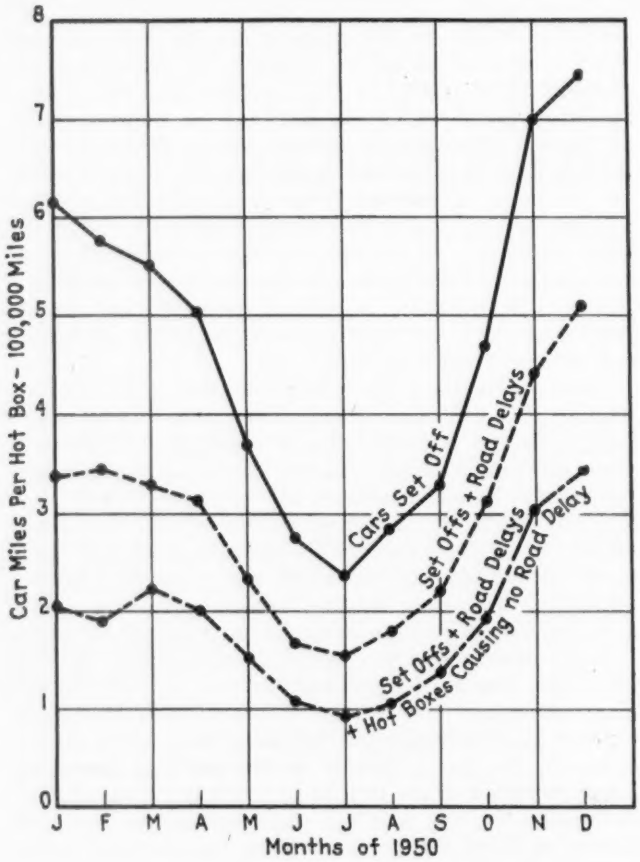
[11] In these figures no hot box is counted more than once on any division during the same trip even though it is necessary to repack or rebrass box more than once. Item (a) does not include cars set off and (b) does not include cars set off or those causing road delay.

[12] A defective bearing is defined here as one requiring attention other than periodical repack or other requirements under interchange rule 66 or yard and terminal inspection; it includes hot boxes, cut journals, and repack, rebrass or R & R (remove and replace) etc. because of improper bearing conditions found in service operation.

[13] F. K. Mitchell, "Lubrication and Hot Boxes," Proceedings Pacific Railway Club, V 33, July 1949, p 17-22.

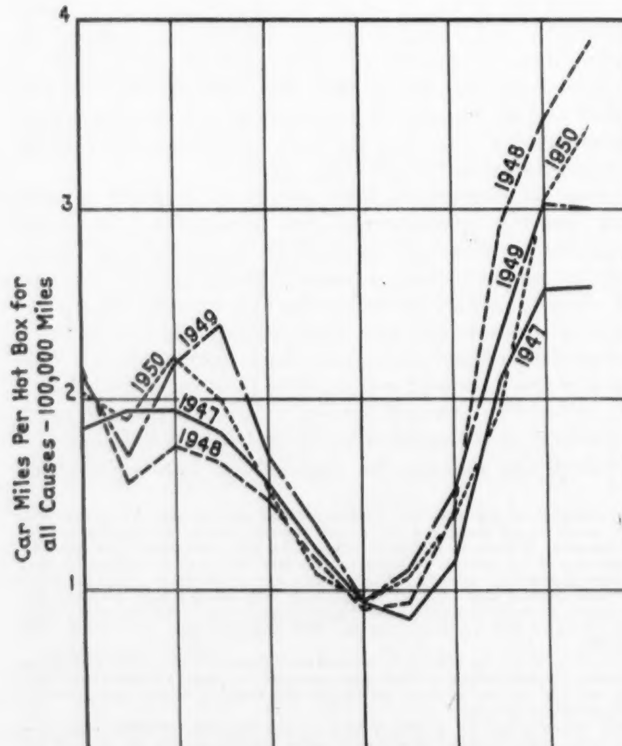


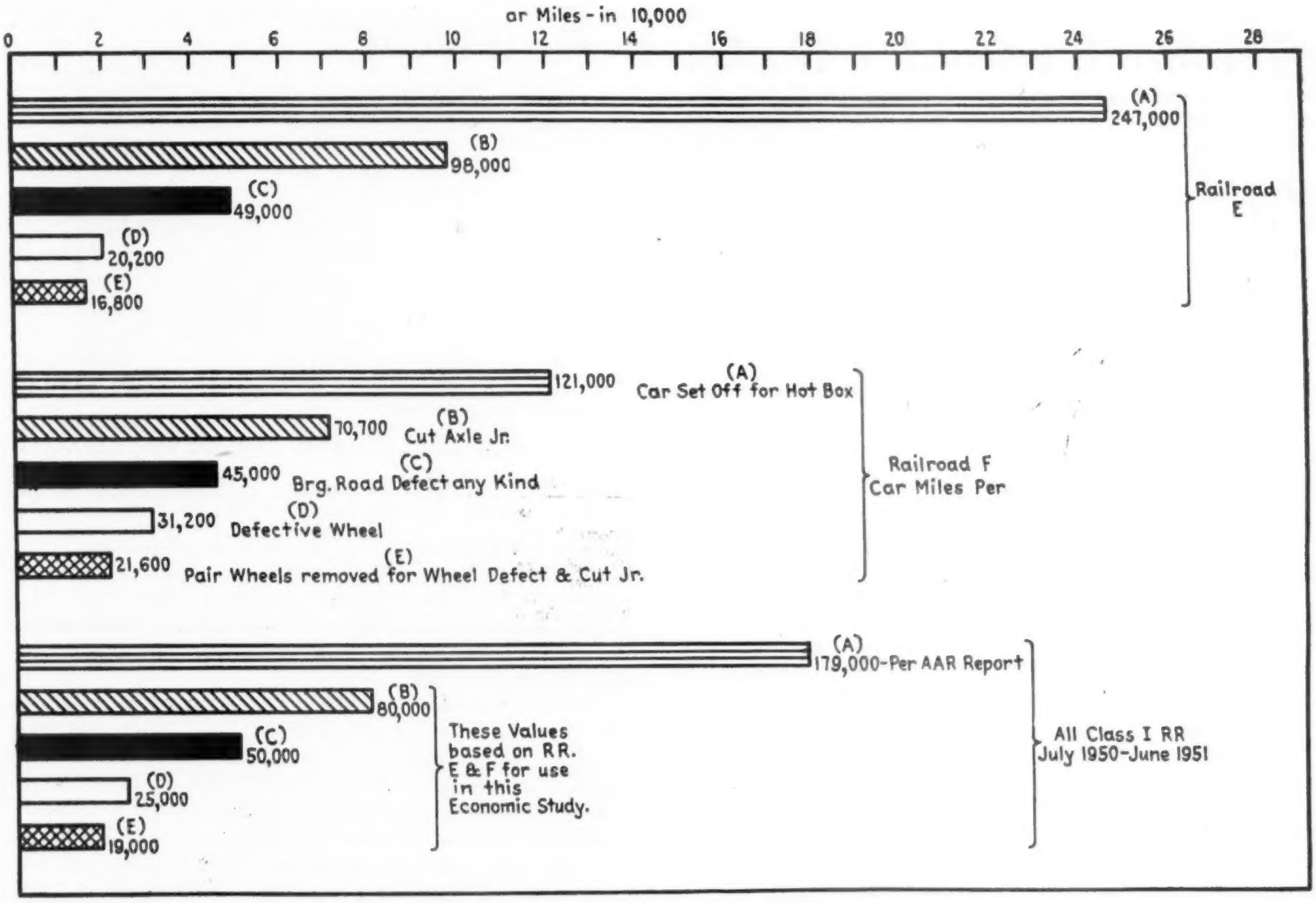
▲ Fig. 11—Plain bearing performance on freight cars on Railroad C



▲ Fig. 12—Freight car miles per hot-box separated between set offs, road delay, and others for Railroad C

➤ Fig. 13—Freight car miles per hot box using total number of hot boxes causing set offs, road delay or no delay for Railroad C. (Similar to lower curve in Fig. 12)





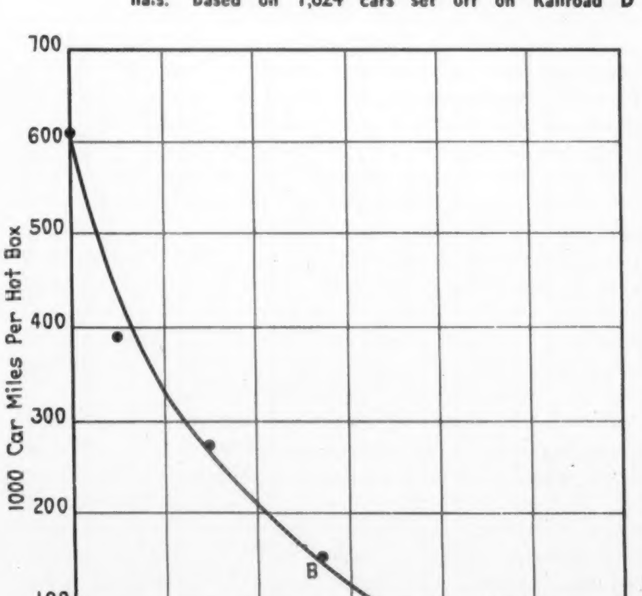
▲ **Fig. 14—Freight car performance data on plain bearings and wheels**

It is customary practice on many railroads to give cars in such trains more thorough inspection and servicing than given cars in other freight trains. It is common practice to assign men to these cars at loading docks where journal boxes are given attention over and above routine inspection. Furthermore, little switching is done on these cars and they do not pass through classification yards so that the packing and brass are not disturbed due to car impacts and reversal of direction of axle rotation. No mention is ever made of the extra costs involved in the special handling of these cars to obtain such phenomenal bearing performance records.

Regardless of the economic results of operating cars at some fraction of their normal rated capacity, so as to favor plain bearing performance, it is generally accepted that a reduced journal load is a very important factor in plain bearing operation. Fig. 15 shows the net or revenue load plotted against the car miles per hot box for 1624 cars set off between division terminals on Railroad D. Here the net loads in these cars varied from no load to full load but were arbitrarily grouped in ten ton loading ranges for purposes of plotting this curve. Except for point *A* in Fig. 15 a systematic deterioration in bearing performance results with increasing journal load. Point *A* includes about one-third tank cars and when these cars are omitted from the calculation then Point *B* is obtained which falls on the curve.

Shoemaker[14] reported that of 1,900 cars set off due to hot boxes substantially all of them were loaded cars. Additional data on another Railroad G[9] gave 74 per cent of cars set off were heavy loads, 20 per cent were light loads, and 6 per cent were empties. On one railroad

▼ **Fig. 15—Effect of weight of lading in freight cars on hot boxes causing set offs between division terminals. Based on 1,624 cars set off on Railroad D**



[14] Perry M. Shoemaker, "The Railroads' Journal Bearing Problem," Proceedings New York Railway Club, October 20, 1949.

where loaded coal car represented about 11 per cent of the system mileage for loaded cars it was found that 30 per cent of the cars set off for hot boxes in one year were cars loaded with coal. In another case about 11 per cent of the cars set off for one year were loaded with sand, gravel, stone, or pulpwood even though this traffic was only slightly over 1 per cent of total loaded car miles for the system.

Again overloaded cars and misplaced or shifted lading increases the load on one or more journals and are advanced as causes for overheated plain bearings. Even under ideal operating conditions in the A.A.R. laboratory tests[15] of the conventional waste packed bearing numerous failures developed under 16,375 lb. static journal load on 5½ in. by 10 in. axle; 11 bearings failed in 20 test series where the same brasses were used from one test to another after rebroaching; 8 bearings failed in 9 test series where new brasses were used in each series.

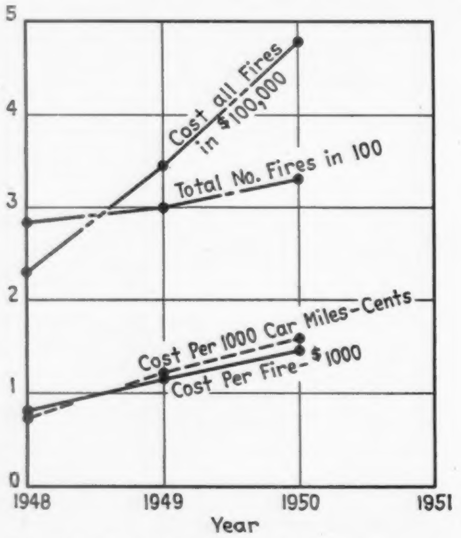


Fig. 16—Cost of fires due to overheated plain bearings on freight cars of all Class I railroads

The railroads in the Pocahontas region hauling coal generally have considerably better hot box performance from the standpoint of cars set off than most of the other roads. Their record is often submitted as an example of what can be done and to refute the findings in Fig. 15. The records of these coal roads may be explained by such factors as (1) generally a higher density of traffic which permits them to support and concentrate more expense on journal box maintenance; (2) a larger percentage of system cars remain on their lines or in routed interchange; (3) a smaller proportion of foreign cars is handled; (4) they do not receive much traffic from many interchange points where inspectors are not maintained, and (5) they have little short haul traffic.

Fire Losses Due to Overheated Bearings. Overheated plain bearings on freight cars lead to considerable fire damage and destruction to cars and contents. The number of these fires and their costs are given for three years[16] in Fig. 16. While this economic loss was only 1.59 cents per 1,000 car miles in 1950 it was over twice the cost in 1948. An A.A.R. report[16] states with reference to eliminating these fires "an ultimate remedy would be the replacement of the present type of bearings

[15] Exploratory Tests to Establish the Functional Characteristics of Truly All Year New and Renovated Car Oils, Fifth Progress Report, October 5, 1950, Associated American Railroads, Chicago.

[16] Fire Protection and Insurance Section, No. 115, June 1949; Nos. 119-120, June-September 1950; Nos. 123, June 1951; Associated American Railroad, Chicago.

TABLE 1—MILEAGE RECORD ON SOME ROLLER BEARING EQUIPPED FREIGHT CARS

Railroad	Number of cars	Type car	Car miles accumulated estimated
1	800	50-ton stock	85,375,000
1	9	50 ton box	4,904,000
2	5	50-ton box	527,000
3	1,000	70-ton hopper	38,694,000
4	50	50-ton box	1,312,000
5	40	50-ton box	11,706,000
6	10	50-ton box	951,000
6	12	70-ton cover hopper	6,200,000
7	20	70-ton ore	800,000
7	48	50-ton box	8,706,000
8	10	70-ton hopper	120,000
9	21	70-ton cover hopper	1,103,000
9	400	70-ton cover hopper	3,000,000
10	77	70-ton cover hopper	2,367,000
10	6	Caboose cars	484,000
11	20	Caboose cars	822,000
Total	2,528		167,071,000

TABLE 2—WEIGHT COMPARISON OF ROLLER BEARING AND PLAIN BEARING EQUIPPED CARS 50 TON CAPACITY

Type of truck side frame on		Increased or decreased weight of roller bearing application over plain bearing per car, lbs.
Roller bearing	Plain bearing	
Integral box–Fig. 1	Integral box	112 increase
Integral box—Fig. 1	Vulcan	336 decrease
Modified vulcan—Fig. 4	Integral box	272 decrease
Modified vulcan—Fig. 4	Vulcan	720 decrease
Andrews—Fig. 2	Andrews	320 decrease
Vulcan—Fig. 3	Vulcan	422 decrease

with roller bearings——."

Performance of Roller Bearings. A record of 167,071,000 car miles is exhibited in Table 1 for 2,528 freight cars equipped with roller bearings on twelve different railroads. Only one hot box has developed in this mileage and no other cars have been set off between or at division terminals. In this economic study a value of 15 million car miles per hot box (including those causing set off, road delay or no delay) is used. This value is conservative considering the above record on freight cars and still greater mileage experience on passenger cars and locomotives. It is further calculated in this study that after the bearings have been in service for many years that the average yearly replacement will be 3 per cent as determined by inspection at the time wheels are replaced.

In addition to the above freight cars there are 625 cars being currently equipped. Also 550 express refrigerator cars have been in service for over 3.9 years and 258 freight cars on one foreign railroad operating through desert territory. Privately owned cars, not shown, also total 3,068 cars operating on various industrial or mining properties.

Weight Comparison. It is too often assumed that the roller bearing application represents a considerable increase in weight over the plain bearing. This assumption is not only erroneous but the reverse is often the case from a consideration of the actual weights presented in Table 2. Here it is shown that a reduction in weight of 272 lb. accompanies the roller bearing on new cars (Fig. 4) if compared with the integral box frame with plain bearings; a reduction of 720 lb. if compared with the Vulcan frame with plain bearings.

Friction. This economic study does not attempt to evaluate any differences in the frictional characteristics of the two types of bearings. Laboratory test results are often submitted to prove some contention, but such findings are based on a static radial loading with no application of (a) dynamic loading, (b) lateral forces, or (c) displacements which take place in the bearing under service conditions. It is well known that a radially loaded plain bearing which has established an oil film of clean oil and reached equilibrium temperature presents good frictional values. We are all familiar with the really successful plain bearings in various industrial or marine

applications where provisions for reliability of service results in a cost comparable or even exceeding that of the roller bearing.

The conventional waste packed bearing operating on freight cars has little resemblance to an adequate design of plain bearing. It invariably (a) operates on boundary lubrication, (b) uses an oil practically unprotected from contamination by road dirt and water by inefficient dust guards and journal box lids, (c) requires imposition of lower maximum train speeds by time table authority, and (d) has a reliability factor of such low order that over 90 per cent of the mechanical failures occurring on 90,000 freight cars were found to be bearing failures. So when laboratory tests[15] are made with waste packed bearings under ideal conditions, it is not difficult to find low frictional values. Various attempts to improve the plain bearing by using separate sleeves on the axle, improved dust guards, and tight lids, waste retainers, pad and pump lubrication, and other means may contribute to improved operation, but the desired performance requires ultimate design changes and costs which has led all other types of industries to the adoption of roller bearings.

Actual road tests by several Class I railroads on passenger[17] and freight[18] trains have evaluated the frictional resistance of the two types of bearings. These investigations leave no doubt concerning the greatly reduced starting effort in favor of the roller bearings. Further evidence of this is apparent on passenger trains where slack between the coupled cars is virtually eliminated and required roller bearings on the cars to facilitate an easy and impact free start. This reduced starting effort permits increased acceleration of the train and without rolling the packing so as to invite waste grabs characteristic of the plain bearing under rapid acceleration. Since the starting of plain bearing equipped freight trains depends upon serially starting coupled cars, it is necessary to provide a certain amount of slack in the couplings, which requires maintenance to stay within proper limits. Difficulty is experienced at speeds of several miles per hour when the slack permits groups of cars to be jerked or strike other groups of cars or at higher speeds when internal collision or impact also occurs between cars. This question of slack has been discussed in the literature from the standpoint of draft gear failures, maintenance, operation, and lading damage.[19, 20, 21] Roller bearings will permit the reduction of slack in the couplings between freight cars; while no operating data are presently available, it is logical to expect material improvement in the above deficiencies present with plain bearings.

These road tests further showed a reduction in friction at all speeds in favor of the roller bearing except one series of freight tests[18] at 10 mph. there was a slight difference in favor of the plain bearing. Otherwise the freight car tests showed the following reduction in train resistance in favor of roller bearings:

(a) Summer tests—first 10 to 20 miles of train operation 10 to 35 per cent reduction.

(b) Summer tests—after running cars 10 to 20 miles equilibrium bearing temperatures were reached and here the reduction was 5 to 15 per cent.

(c) Winter tests—first 10 to 20 miles 23 to 25 per cent.

(d) Winter tests—after running cars 10 to 20 miles 4 to 18 per cent.

(To be concluded in February issue)

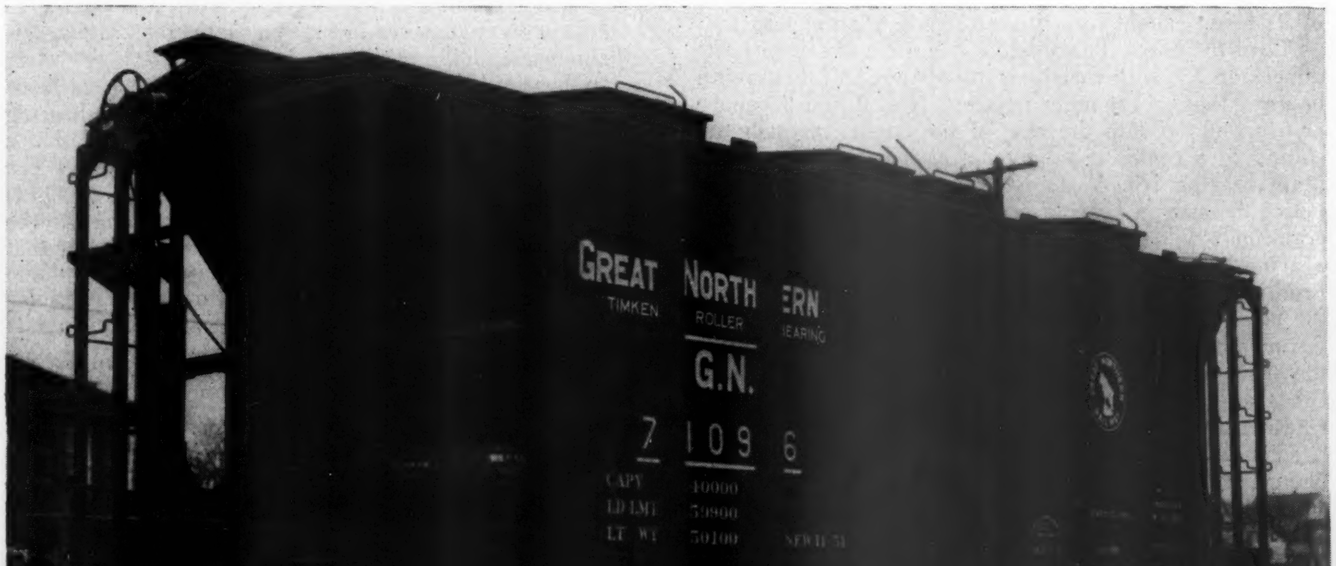
[17] "Rolling Resistance of Freight and Passenger Cars Equipped with Roller Bearings," Report on Assignment 9, American Railway Engineering Association, 1949, page 206-209 which states "Timken, Hyatt, Fafnir, and SKF are the principal suppliers of roller bearings for railroad cars; however, Timken is the only company having freight-car applications up to this time." Claims that other companies had applications on freight cars were checked and found to be on box cars equipped with high-speed trucks and assigned exclusively to head-end service on passenger trains.

[18] "Roller Bearings for Freight Cars," Report of the Mechanical Advisory Committee to the Federal Coordinator of Transportation, Associated American Railroads, 1935.

[20] "Draft Gear Maintenance", G. Q. Lewis, Car Foreman's Association, April 13, 1942.

[21] Mastering Momentum, Lewis K. Sillcox, Simmons-Boardman Publishing Corporation, 1941.

[22] "Protection of Lading and Equipment", P. W. Kiefer, Mechanical Engineering, Volume 70, December, 1948, P. 1018.



One of 100 covered hopper cars recently delivered by the American Car & Foundry Co. from its plant at Berwick, Pa.

Aligning Diesel Main Bearings with a Transit*

The use of an engineer's transit, by lining up an inside micrometer with the horizontal cross hair, makes possible precision measurements that result in better engine performance.

ALTHOUGH misalignment of main bearing bores is more critical in some makes of engines than in others, there are limits of misalignment common to all makes that must be observed. These bore variations are small and hard to find. Constant and repeated checking may fail to show any unusual condition but still certain bearings in the engine constantly wear out before the others, throwing an unnatural load on the remainder and shortening the life of all the main bearings. With the offending engine steadily wearing out its main bearings, low main-bearing oil pressure difficulties constantly appear on the work reports. If the path of least resistance is followed, only those main bearings showing excessive wear will be changed out in a desperate endeavor to keep the locomotive in service and the whole affair will culminate in a broken crankshaft or one that is scored or overheated.

An engine that fits into the above sequence of events indicates that some of its main bearing bores are not parallel and are not in line with each other.

Fig. 1 shows schematically just what kind of a main-bearing condition can exist without the slightest chance of its being caught by using an inside micrometer.

All of the bores, 1 through 7, can mike the same (note dimension X), with variations of only one-half thousandth between them. Yet main bearings Nos. 2 and 3 can be drifting off up into the case of the engine, actually resulting in a center misalignment as shown at *B* and *A*. Main bearing No. 4 can be back precisely on line but notice the step in bearing centers between 3 and 4. The crankshaft will try to run in a straight line so that the bearing loads on the caps at 2 and 3 will be very high, resulting here in poor bearing life. Worse yet, every time the crankshaft revolves it undergoes a complete cycle of flexure which, at the rate of 700 or 800 r.p.m., will fatigue the shaft, starting a progressive crack. If the offset between adjacent bearing bores is severe enough and the rotative speed of the crankshaft is high enough, these two conditions can and will result in a harmonic vibration being set up in the crankshaft that will fail the shaft in a surprisingly short length of time.

Bearings No. 5 and 6 can mike perfectly with an inside mike although the bearings are cocked. The centers of main bearings 5 and 6 are not badly off the true centerline but the fact that they are cocked puts a dog-leg in the shaft. Inside micrometer readings, no matter how carefully taken by the best machinist in the shop, will not indicate the dismal main bearing alignment condition shown at the top of Fig. 1. Some means must be found to reference the center of one main bearing with the center of its neighbor or the true condition of any set of crankshaft main bearings is pure conjecture. Engines have been found with all of the main bearing misalignments shown on this sketch. These engines after reboring with the aid of a transit are rolling up main-bearing life previously thought impossible.

Careful examination of the main-bearing shells removed from a diesel engine suspected of main-bearing misalignment is only an approximate indicator of main-bearing alignment. If the main-bearing shells are examined before any gaulling or cutting has taken place, it is possible to trace a high cap bore by the fact that the half of the shell in that cap will be thinner than its neighbors.

Careful bearing examination can sometimes reveal the presence of a cocked bore by examining both the upper and lower shells of the bearings and looking for excessive wearing or marking at diagonally opposite edges. This is quite difficult to see as too often this cocked condition results in tearing up the shell surfaces after only a few minutes of running time with new shells. In one case an engine was in for constantly reoccurring low main-bearing oil pressure and was given a very close main-bearing examination. No evidence of cocked bearings could be found from examination of the main-bearing shells although transit work subsequently showed that a number of the main bearing bores were cocked. The principal reason for deciding to rebore this machine was the pronounced evidence of the dropping of the crankshaft down into the lower shells and the fact that as the shaft dropped, it slid off to one side.

How the Transit Is Used

If an engineer's transit is set up, as shown at the bottom of Fig. 1, and its line of sight centered so that it lies equidistant from the crowns of No. 1 and No. 7 bearings, dimension *X*, a true alignment picture of the crown of each bearing may be had. One end of an inside micrometer is held at the exact center of the crown of any main bearing and the length of the micrometer is adjusted until the end of the micrometer barrel just touches the crosshair on the transit. With a little practice the accuracy of this method is assured because:

1. A line of sight does not bend and hence is a true comparator.
2. A line of sight has no thickness and the shadow of the enlarged end of the micrometer can be adjusted until it just touches the vertical crosshair in the field of the instrument.
3. By adjusting the instrument so that dimension *X*

*Abstract of a paper delivered before the December meeting of the Chicago Railroad Diesel Club by E. H. Weston, assistant chief mechanical engineer, Chicago & North Western.

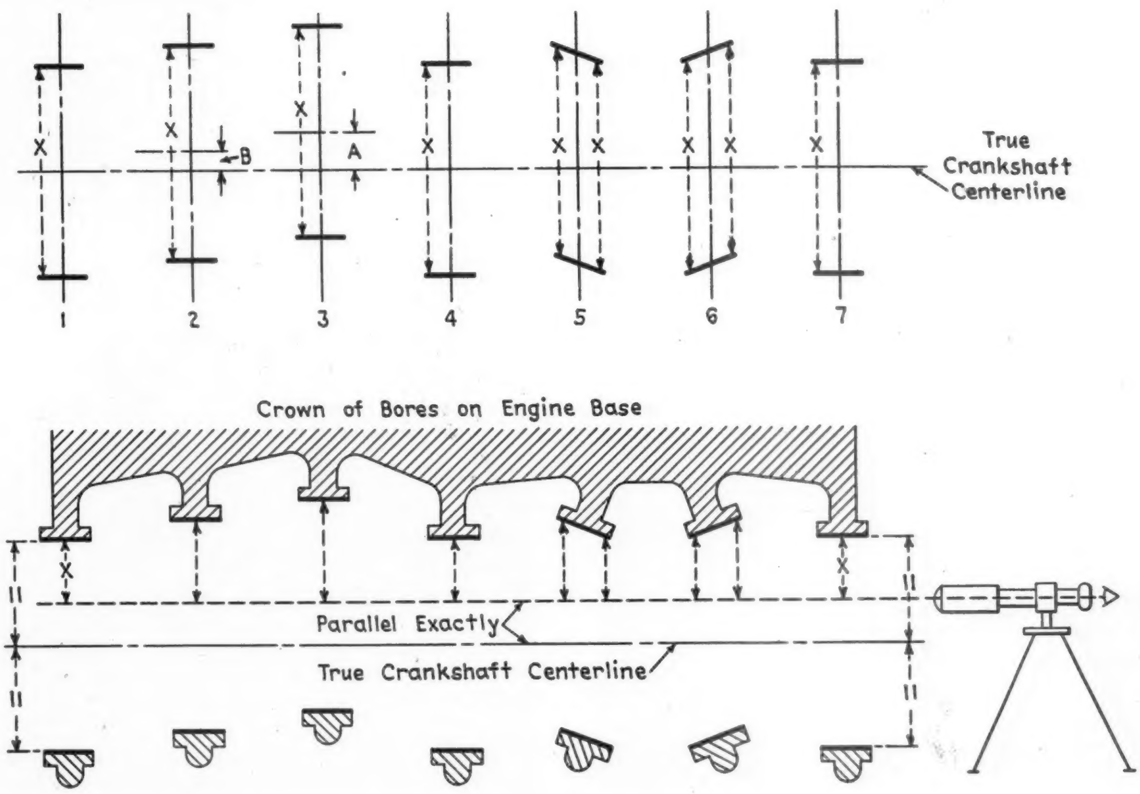


Fig. 1—Misaligned main-bearing condition that would not be caught with inside micrometers

is obtained at either end main bearing, a line of sight is produced that is absolutely parallel to the crankshaft centerline.

Catching a cocked main bearing now is no problem for either edge of the crowns of all main bearings can be miked to the line of sight and variations in reading of the micrometer will tell the story in a positive manner.

In making preparations to use an engineer's transit to run over the main bearings on a diesel engine, the engine is split and removed from the diesel unit and is laid upon its side. A precise hand level with a bubble tube having graduations of one-half thousandths per foot should be used to level the engine case exactly both longitudinally and laterally. The leveling of the engine case is very important and contributes greatly to the accuracy of subsequent measurements. Neither a combination square bubble nor a carpenter's level is anywhere near accurate enough for this work. If transit work should carry over from one day to the next, the engine case should be again checked for level and any settlement corrected before any more measurements are made.

The center of each main-bearing crown should be carefully scribed on the crown of the bearings. Since micrometer masurements are to be made at either edge of each crown, some convenient amount should be marked on the scribed crown centerline in from either edge and this dimension transferred to the other bearings. A small jig as shown in Fig. 1 can be made to assist in holding the micrometer steady and perpendicular to the surface to be miked.

To make measurements horizontal to the plane of the engine, lines may be scribed on each main bearing bore equidistant from the split of each bearing and the micrometer set in a second jig to insure its being kept perpendicular to the bearing bore. In the photograph a slightly different aspect of this type of measurement is shown in that measurements are made from the inside face of the toes used to align the main bearing caps on this particular type of diesel engine.

Fig. 4 shows the engineer's transit set up ready to start work. The transit has a vertical motion that allows the telescope to be tilted up or down without disturbing lateral adjustment and this motion permits looking at the micrometer ends at any bearing even though the instrument may be lower than the centers of the bearings.

The instrument is adjusted first by eye and then two micrometer measurements are made at the crown of the nearest main bearing and at the crown of the farthest main bearing. The instrument is adjusted horizontally by adjusting screws and by small amounts of rotation of the transit body until the micrometer readings at the nearest and farthest main bearing crowns are identical (dimension *X* in the lower part of Fig. 1).

With the instrument tightly clamped as shown in Fig. 4, one end of the micrometer is held against the scribed line on the crown of each bearing, using the positioning jig as shown, and the barrel of the micrometer is run out until the end of the micrometer just touches the crosshairs in the field of the telescope. A succession of readings are taken at either edge of the crowns of all of the main bearings. Any variations in the base micrometer readings, then, are an exact measure of the vertical misalignment of the bearing crowns. There the edge of one side of the bearing differs from the micrometer reading of the other edge of the bearing, an exact measure is had of the amount of cock there is in that particular bore.

An engineer's level may be used to develop the horizontal alignment of the main bearings using the micrometers set vertically as shown in Fig. 5. The micrometer barrel is extended upwards until it just touches the horizontal crosshair in the field of the telescope on the engi-

Fig. 2—Jig for holding the micrometer while taking the necessary readings with the transit

Fig. 3—Jig to hold the mike while taking measurements horizontal to the plane of the engine

neer's level. Since little instrument adjustment is needed here, the set-up is quite simple and the micrometer readings directly give the answer without any centering needed by the instrument.

Calculating the Corrections

The drawing office is called into the picture as soon as all shop readings have been made and a layout is prepared on a drawing board of the data. A magnified scale for the drawings is used such that one thousandths of an inch difference in a shop instrument reading is platted equal to one-tenth of an inch on the drawing board.

The drawing board layout is started by simply drawing a straight line anywhere on the paper. This line is the line of sight of the transit and is so marked in the sketch. From this line is laid off to scale the actual readings of the micrometer used in the shop. The twin dashes indicate the front and back edge of the crown of each main bearing. The lower set of dashes are, of course, the front and back edges of the main bearing caps and are platted from the crowns by using the inside mike readings for each bore.

The bore of main bearing No. 1 is now divided by two and its center is platted on the layout to scale and exactly in the center of the upper and lower set of dashes —note the equal signs. The bore of main bearing No. 7 is exactly located on the drawing in the same manner. The centers of main bearings No. 1 and No. 7 are in turn connected by a straight line and this line is called the true crankshaft centerline. The sketch is marked to show its location. The exact centers of the two end main bearings are used to locate the true crankshaft centerline. This is done because of the location of auxiliary drive gears at the ends of the engine. In case of damage to either one or both of the end bores, any other two main bearing bores can be used to locate the true crankshaft line. A check of the shop data taken with the transit will indicate which two main bearings would be the most reliable to use if the end bores are bent or cocked badly.

A check is now made by measuring the amount of drift between the true crankshaft centerline and the line of sight. The drift is checked by measuring the distance between each line directly under the centers of the No. 1 and No. 7 main bearings. See dimensions marked *X1* and *X2*. Any difference between these two measurements *X1* and *X2*, will be a measure of the amount the line of sight was not parallel to the true crankshaft centerline. Any large variation here will cast suspicion on the accuracy of the shop measurements. Here is the first point a good check on the accuracy of the instrument work can be made. Generally, variations between *X1* and *X2* will amount to .002 or .003 in. only and result from the thickness of the crosshair on the instrument or a small amount of parallax in the eye-piece of the instrument. Remembering that two or three thousandths of drift is spread over the entire length of the main bearings, generally some eight to twelve feet, the order of accuracy here is greater than that control used by the manufacturer in originally boring the crankshaft bearings.

The sketch at the bottom of Fig. 6 is a continuation of the one at the top. In the lower sketch the new bore to be cut into the main bearings is platted to scale about the true crankshaft centerline and the trace of this new bore is drawn through all main bearing plats. Any of the dashes representing the crowns of the bearings that lie inside of the new bore line indicate those crowns that must be cut. The amount these crown dashes are lower than the new bore in tenths of an inch indicate the exact amount in thousandths that must be removed from each crown. Any crown dash that lies above the new bore line as at No. 1 on the slide, indicates a location where the

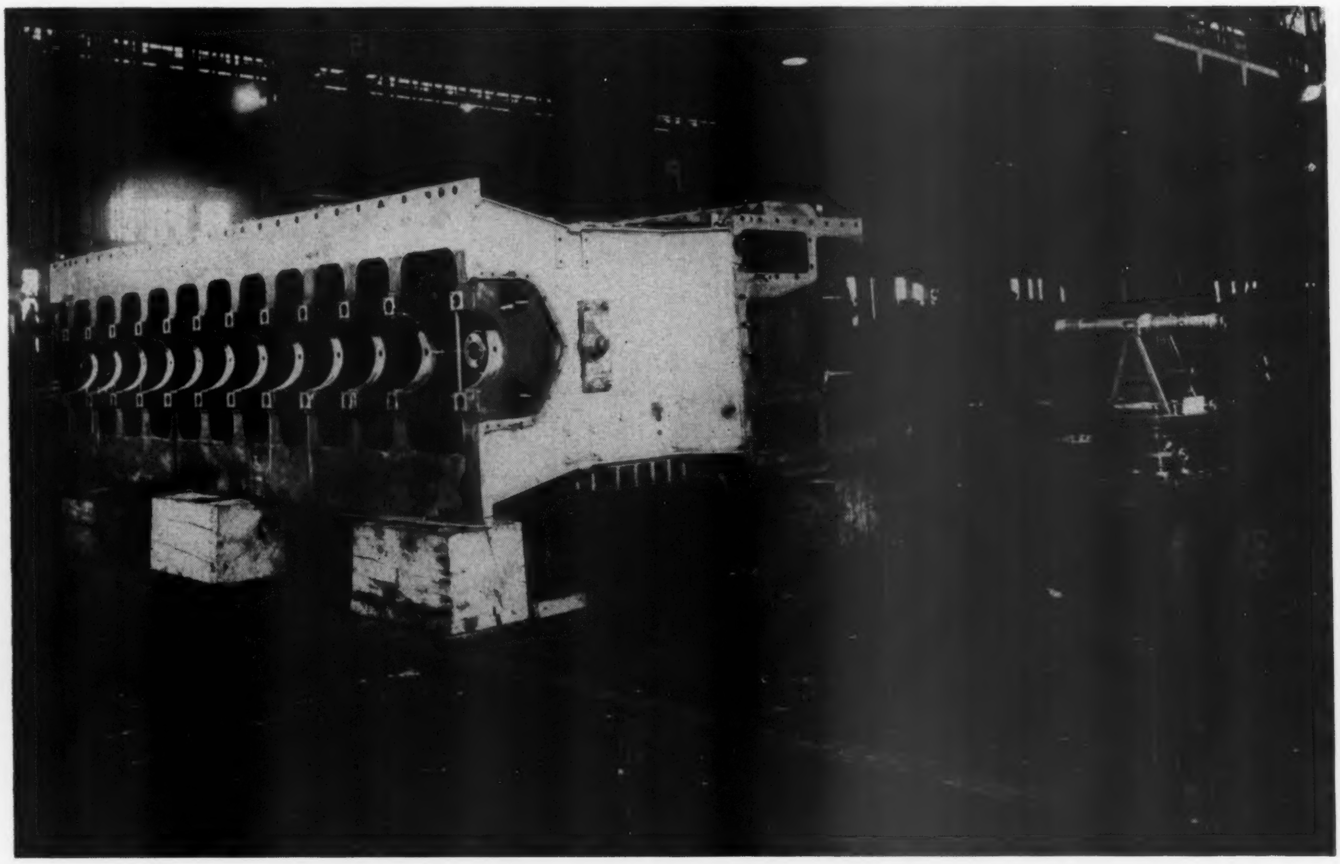
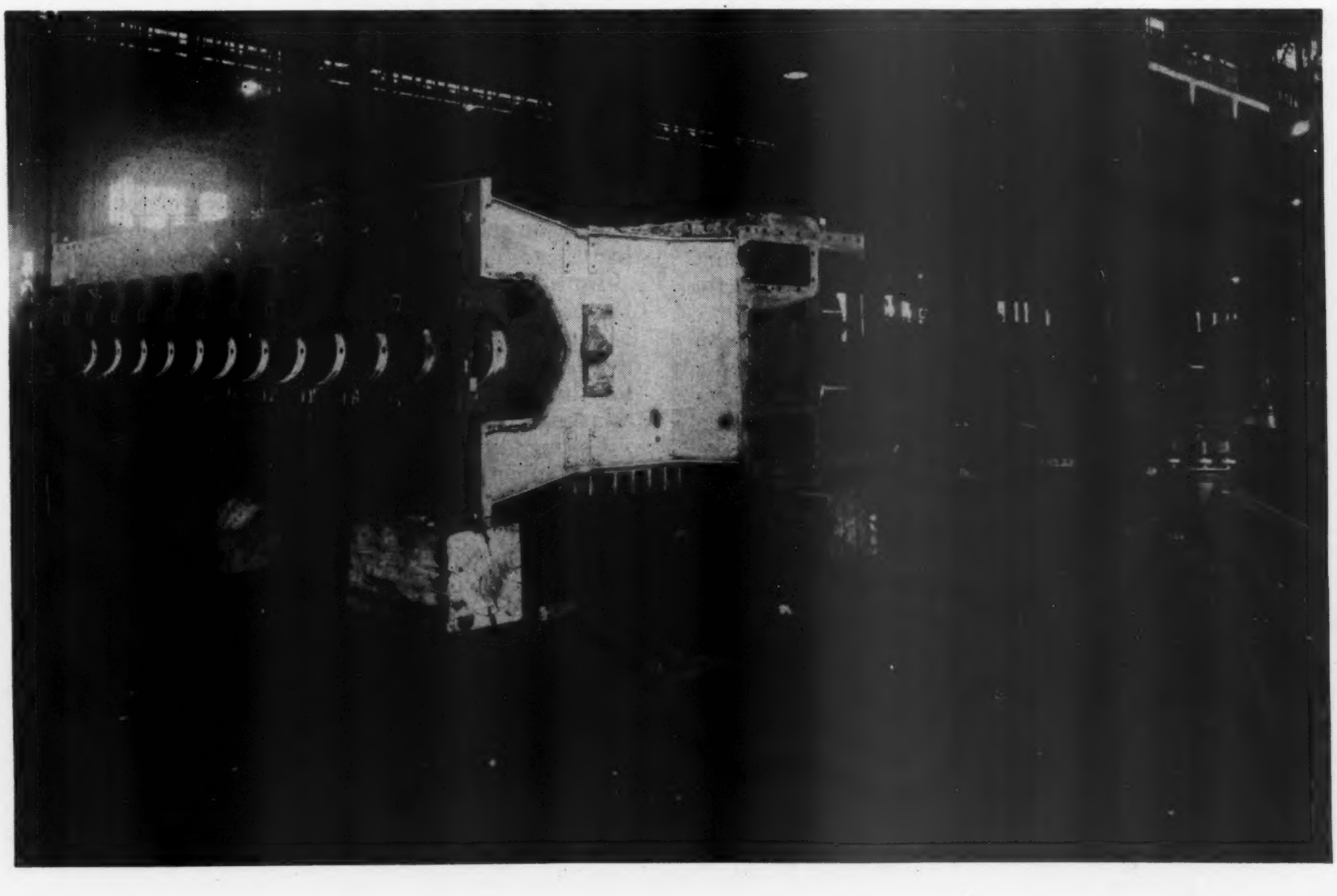


Fig. 4—The transit in position for taking readings on the crowns of the main bearings

Fig. 5—Position of the transit and micrometers for checking the horizontal alignment of the main bearings



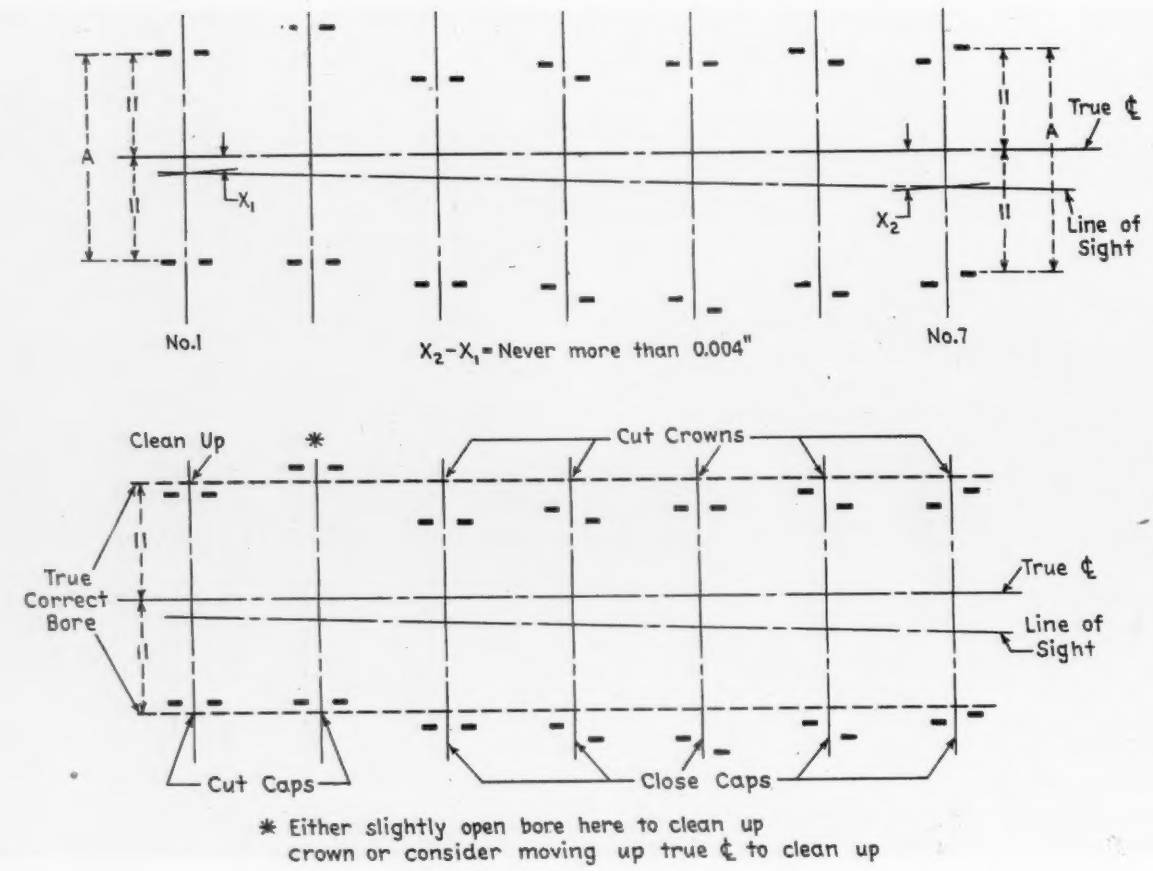


Fig. 6—The readings taken with the transit are laid out to a magnified scale. The dashes represent the front and back edges of each main-bearing crown

new bore might have to be opened slightly to clean up or, if severe enough, the amount the entire crankshaft centerline must be moved upwards to touch the high crown.

Any dashes representing the caps that lie below the new bore line indicate to scale which caps must be closed and by what amount they should be closed to clean up. Cap dashes that lie above the new bore line indicate which caps are already too high and hence, must be cut.

A written schedule can be prepared for the shop on the basis of the drawing layout that will outline the amount of cut and amount of cap closure to revise each main bearing and prepare it for boring.

A similar set of drawing board layouts can be made to study the horizontal alignment of the main bearings and a similar schedule prepared to bring all horizontal surfaces into line for boring. Small amounts of horizontal misalignment can be overcome by closing the cap at the affected main bearing an additional amount. This additional closure will amount in thousandths to just the same amount in thousandths that the bearing is horizontally misaligned.

Reboring the Bearings

A set of three bronze bushings is now prepared to fit into three of the main bores to position the boring bar. The bronze bushings are turned about .012 in. smaller than the nominal main bearing bore. This .012-in. smallness makes it necessary, of course, to shim these bushings in their respective positions to hold them tightly between the bearing cap and crown. They may be moved from side to side or up and down, depending upon just how the drawing board layout indicates the surfaces of the cap and crown of that bearing compared with the projected new bore. They are shifted according to the prepared boring schedule until their centers correspond with that wanted in the new bore. The caps are tightened about the three bearing positions and the boring bar is threaded through the bushings. (The boring bar bearings are just one and one-half thousandths loose on the boring bar.) A second check on the accuracy of the projected alignment and calculations is afforded when the boring bar threads through these three holes neatly and evenly.

Do not close the caps at the locations of the boring-bar bearings. At the start these bores must be protected because they have been defined by the transit and hence the location of their surfaces are known. The shimming for the three bar bearings will depend on the transit measurements.

Closing all caps to a point where the layout shows that a .005-in. cut can be carried in the bore will prove most satisfactory. The additional .005 in. will give enough additional stock to overcome local out-of-round and score marks in the main that is to be bored.

The boring tools can now be run through all of the main bearing bores except, of course, the three original bearings. After boring all intermediate bearings, one bronze bushing at a time is moved to an adjacent location, shimmed evenily all around now, and then the boring tool is run through the former location of the bearing.

Depth of cut of metal on all bores may be checked against the original transit measurements to see if the amount of metal being removed checks with the forecast thickness to be taken out. Checking the depths of cut when boring the first main bearing and the ease with

Fig. 7—Layout for reboring the engine

which the boring bar may be threaded through the three bronze bushings when first set up are important sign posts along the road indicating whether or not your original transit measurements are correct.

After completion of all borings it is advisable to set up the transit again and prove that all crowns are now the same distance from the line of sight. On a number of rebored engines the crown surface alignment has checked throughout the engine to less than .001 in. variation between surfaces.

With this method of reboring main bearings, a line bore can be put through a set of 12 main bearings over 12 ft. long and not deviate to one side or the other or up or down more than .002 in.

Steps between consecutive crowns vary .001 in. or less. Center alignments of one main bearing bore with another do not vary in location by more than .001 in. Bearing tip or out-of-plane of the crowns is eliminated in all cases.

By referring the transit alignment figures to each of the end main bearing crowns the auxiliary gear-train alignment with the main crankshaft drice gear is improved. Since out crankshaft now lies straight and true in its rebored mains, there will be no cocking of the main crankshaft end gear and the auxiliary end gears.

It sometimes happens that certain crowns in the main-bearing alignment make it necessary to move the centerline of the rebored main either up or down to clean up the lowest or highest crowns without opening the bore. When this occurs, it is advisable to limit the raising or the lowering of the new crankshaft bore to a maximum of .005 in. A movement either up or down of the crankshaft bore of .005 in. will not increase or decrease the lash between the main crankshaft gear and the auxiliary end gear by more than three-thousands of an inch. If the transit measurements should indicate a movement of the centerline of the rebored crankshaft of more than .005 in. either up or down, another check or layout must be made to study the maximum and minimum gear lash on the auxiliary end gears.

Operating Results

Service results to date have vindicated the transit method of aligning the main crankshaft bores. The past so-called normal life of main bearings on a number of 2,000-hp. engines has been doubled and perhaps tripled. We have four test engines in service, three 2,000-hp. road passenger and one 1,500-hp. road switcher. The first of the passenger engines is 10 months old, the second, six months old and the third, about one month old. None of these machines with the exception of the six-months-old engine has used a single main bearing shell since being rebored, notwithstanding the fact that a very close main bearing inspection is being carried on these units. The six-months engine got into lube-oil filter difficulties and high sediment which cut out a number of cap shells.

The road switcher has been in service about one month after being rebored. This machine came in with a broken crankshaft and a cap and crown alignment that was the poorest on record. The bed plate of the engine had to be built up with weld to provide material in certain locations for boring. We, nevertheless, laid out this machine, rebored it, reset its caps and aligned its A-frame with the bed plate by transit. When we reset the A-frame on the bed plate, we did so using the rebored crankshaft centerline as a base line and used the vertical motion of the transit telescope to line up the cylinder bores with the crankshaft. This 1,500-hp. engine represents our most ambitious project to date and has given us a great deal of satisfaction after over one month of service without trouble of any kind.

The second most extensive repair job was done on one of the three passenger engines. It had one thrust bearing badly bent, and heat had warped a number of the upper crankshaft bores so greatly that the upper crankshaft was dropped .0055 in. to get the boring tool into sound metal. The transit was the sole method of shop control in machining the lower thrust bearing after building up and in dropping our upper crankshaft centerline.

Nickel Plate Calumet Terminal

(*Continued from page 42*)

which is electrically operated, on a overhead runway in front of the boilers.

All steam condensate, except what is lost in locomotive blower lines in the enginehouse, is returned to the feed-water heater. Any additional make-up water that is required is taken from a sump in the boiler house which collects the discharge from the compressed-air cooling units. Water from the latter source is ample to take care of the normal requirements for make-up purposes. The water from the sump is pumped through the feed-water heater line only when an upper float-controlled valve on the feed-water heater is open, and a supply of water is in the sump. This is done by electrical switches run in a series to control the sump-pump motor. Should there be a lack of supply or a failure of the pump, a second feed-water float-control valve, set slightly lower than the first, will take water from the general water supply line. The boiler make-up water is treated by an injection system after it leaves the feed-water heater. The feed-water pumping and piping are arranged in duplex.

The ash-handling system, having a capacity of eight tons an hour, is of the steam-jet type, with an exhaust air washer, or dust eliminator, and an automatic timing control. The ashes are conveyed from the boilers through a hopper and underground piping to an elevated 25-ton capacity ash-storage tank. This system also removes the accumulation from the fly-ash collector.

High-pressure steam is carried more than 3,100 ft. from the boiler house in an overhead insulated conduit to a point near the coach repair shops, and in another overhead line to the enginehouse. A similarly insulated condensate return line and an uninsulated air supply line are also carried overhead on the same supports. Connections to these lines at various points run underground for serving the several terminal facilities.

The hostler's building is in a space between the steam and diesel servicing tracks. It is a one-story building, 20 ft. by 61 ft. This building contains rooms for engine supplies and ice storage, and has locker and wash facilities.

The yard office, between the entrance to the engine terminal and the train yard, is 46 ft. by 97 ft. in size, with a partial second story. The lower level contains a lobby, offices for the yardmaster's clerks and the assistant road foreman of engines; a telegraph and Teletype room with a small parts-cleaning room, a utility room, a toilet and washroom, and a large locker room for accommodating 175 men. The second story has offices for the terminal superintendent, the general yardmaster, the claim agent, and clerical staff, and rooms for stationery and file storage and toilets.

The dormitory building, a two-story structure, is for the trainmen and enginemen, residing for the most part in Fort Wayne, Ind.

On the first floor of the dormitory building is a large kitchen and restaurant, manager's office and living quarters, sleeping rooms for the commissary employees, and a television-equipped solarium-type lounge and reading room. The basement contains a laundry, two rest rooms for use of train crews, a utility room, a conference room, and a food storeroom. All floors have modern toilet and shower facilities.

A pneumatic-tube system was installed between the new and old yard offices and between the new yard office and the enginehouse foreman's office. A two-way radio set, formerly installed in the old yard office to enable the yardmaster to communicate with all switching crews, was moved into his new office.

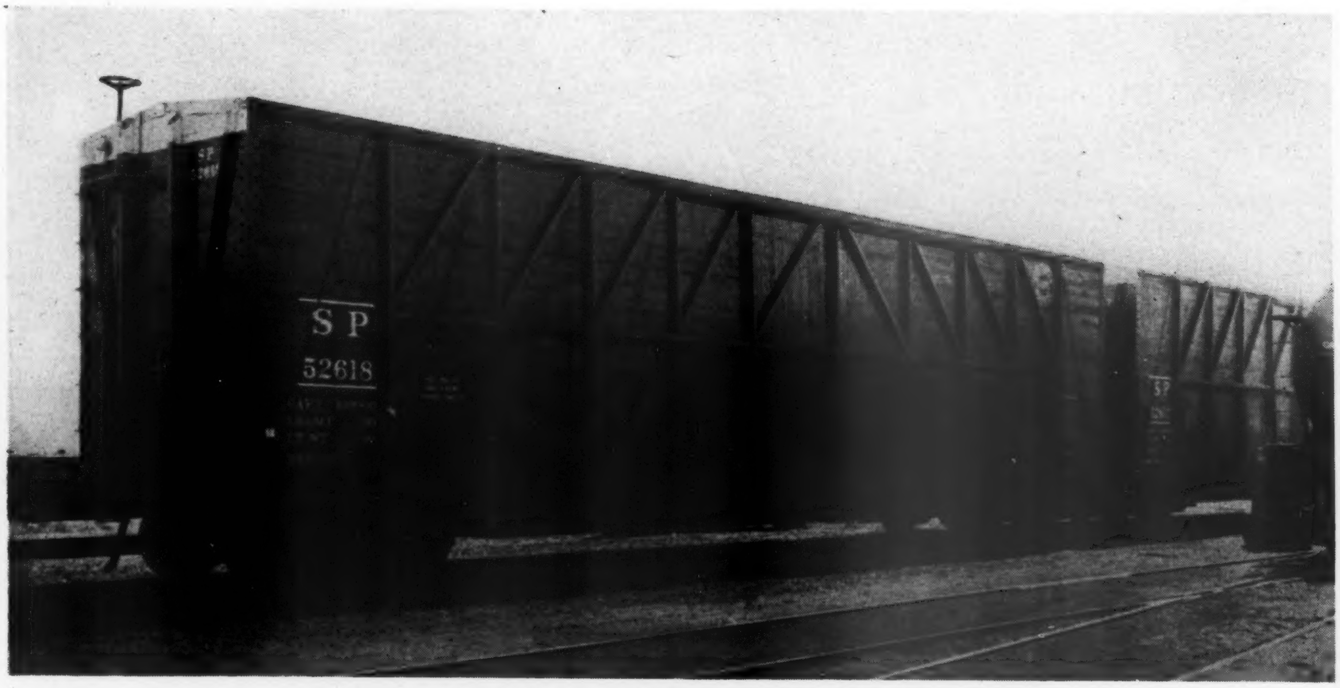
Stand To Clean Diesel Engine Heads

Diesel-engine heads may be cleaned by using a stand with a tilting support for the head which is vertical when there is no head on the stand but tilts to a horizontal position when the head is mounted in place.

The stand has a shaft formed in the top which fits through the injector hole in the head to hold it in place. Scarring is prevented on the injector hole by a brass sleeve which fits over the standard shaft and inside the injector hole.

The base of the stand is $1\frac{1}{4}$ in. by 10 in. by 16 in. The vertical supports are welded to this base and are $1\frac{1}{2}$ in. by 4 in. by 32 in. They are 9 in. apart on the outside edges. The shaft is $2\frac{1}{4}$ in. square where the head slips on. The total length is 47 in., 28 in. from the stand to the fulcrum and 19 in. from the fulcrum to the bottom of the shaft. The stand pivots about a 1-in. bolt on brass bushings tightly fitted to keep the shaft straight. Strap iron $\frac{3}{8}$ in. by $1\frac{1}{4}$ in. extends between the vertical supports to limit the tilting of the stand to the horizontal position.

Cleaning a cylinder head is easy when mounted on this tilting stand



S. P. box cars with 18 side doors and otherwise equipped for handling wood chips

Southern Pacific Outfits Wood Chip Cars

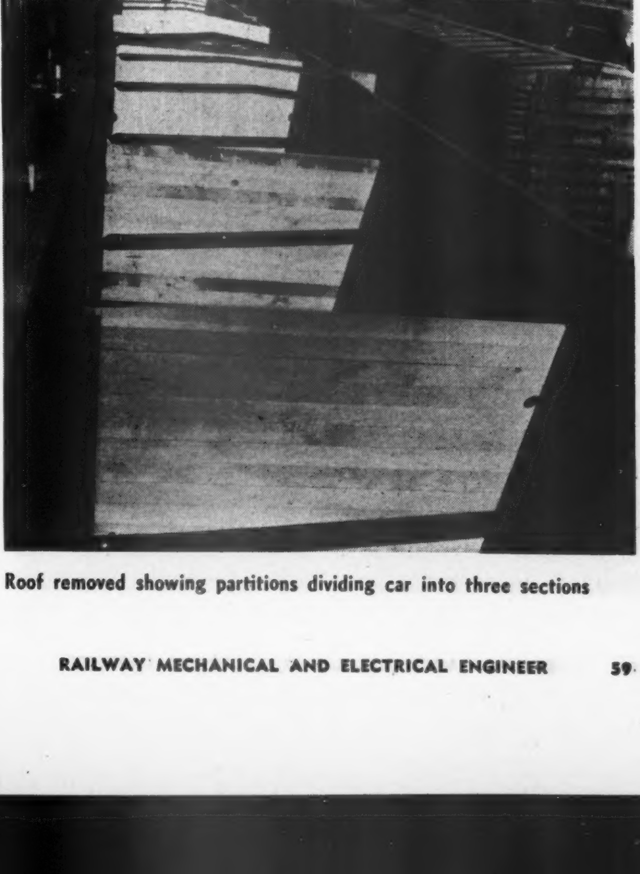
ONE of the interesting and voluminous new freight traffic movements, developed so far primarily in the Northwest, is the shipment of "hogged" fuel and wood chips from saw mills to lumber manufacturing companies for use, among other things, in making a new type of fabricated wood panels and products. The wood chips are bulky and relatively light in weight per unit of volume, so a number of railroads have equipped special cars for the efficient handling of this type of lading.

The Southern Pacific, for example, has outfitted 98, 40-ft. and approximately 425, 50-ft. box cars for handling hogged fuel and wood chips. Eighty-nine other 50-ft. box cars are also now under conversion which will make more than 600 S.P. cars in this service.

The cars selected for the service were on the borderline for retirement, the 40-ft. cars being built between 1913 and 1923 inclusive, and the 50-ft. cars in 1922 and 1923. All of these cars needed extensive repairs to roofs, running boards, carlines, underframes, sides and doors, but could be repaired sufficiently for use in this light-commodity service without having to renovate the entire car.

The illustrations show examples of this type of car now in service on the Southern Pacific in Oregon and northern California as far south as San Francisco bay area. All the cars have roofs and running boards removed. A white strip has been painted across the upper portion of the ends of each car, extending 12 in. down from the top of the car, to warn trainmen that these cars do not have roofs. Some of the cars do not have side doors, the existing doors being boarded up, while others have 2, 6, 8 or 18 hinged side doors per car for unloading purposes. The variation in doors has resulted from various methods of unloading, by suction, hand, or gravity. In cars having 18 side doors, slanting bulkheads have been applied at each end in addition to two intermediate bulkheads, dividing the car into three separate sections.

All of these cars were converted in Southern Pacific shops at Sacramento, Cal., or Brooklyn (near Portland) Ore.



Roof removed showing partitions dividing car into three sections

Pullman Installs Traveling Spray Booths

DeVilbiss equipment saves space, improves working conditions, simplifies installation

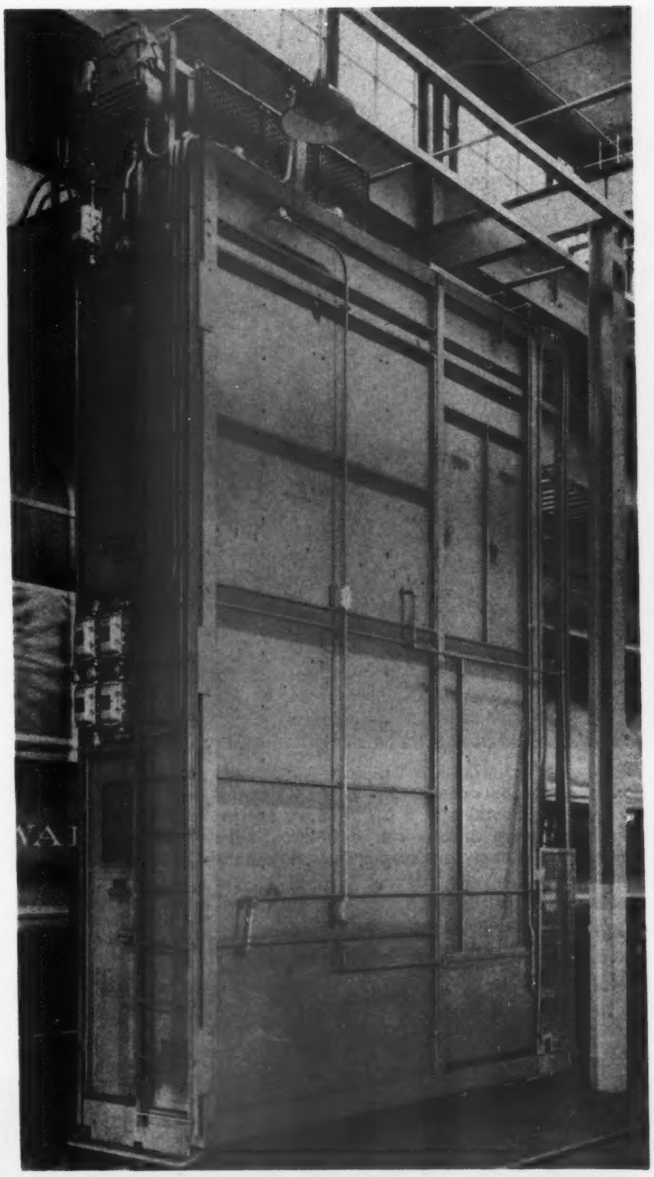
For finishing passenger cars at its Calumet (Chicago) and Buffalo shops, The Pullman Company has installed in each shop two units of a new type of DeVilbiss spray-painting and air-exhaust equipment—a spray booth that travels under its own power back and forth along the sides of the cars while, at the same time, filtering, washing and exhausting the spray-laden air. The painters "go for a ride" in well-lighted, "air-conditioned" surroundings while operating their paint-spray guns. The traveling-type spray booths were designed and erected by the DeVilbiss Company in collaboration with Pullman engineers.

Experience of the Pullman Company is that this type of spray booth has a number of important advantages. For one thing, it is reported that a much better paint job is obtained, with substantial savings in time, because of the ideal working conditions provided. For another, there has been a reduction in the amount of wasted paint because of the more accurate control of exhaust air movement made possible with this equipment. Also, safety conditions have been improved, for the painters no longer have to climb up or down scaffolding, or walk along it, to perform their work. Formerly, passenger cars at the Calumet and Buffalo shops were painted outdoors, when the weather permitted.

Constructed expressly to house the traveling spray booths at Calumet shop, the new paint shop, 44 ft. by 200 ft. in plan, is a concrete-block structure located adjacent to one end of the car-repair shop. In it are two standard-gage tracks running the full length of the building, each of which will hold two passenger cars. The cars are moved from the repair shop to the paint shop on a transfer table. At Buffalo the two traveling spray booths were installed in an existing building.

Booth Construction Described

The spray booths, all mechanisms of which are driven by electric motors, are each constructed somewhat in the form of an inverted U, and travel at speeds up to 25 ft. per min. on separate rails running parallel with the track rails. In plan the booths each occupy an area running 12 ft. parallel with the track and 18 ft. 4 in. transversely with the track. When a booth has been moved so that it straddles a car, the clearance between the booth and the sides and top of the car is about 6 in.



One of the spray booths in operation. One pass of the booth along a car requires about 7 min.

Each side of a booth is provided with a working space 7 ft. long, with two access doors at one end. In this space the painter stands on a power-operated scaffold which, at the touch of a button, he can move up or down to get the desired working height. In the wall behind the painter are four banks of glass-enclosed explosion-proof fluorescent lighting fixtures, two at a low level and two higher up, which are said to give better lighting than is possible in a conventional paint-spray booth.

Each side of a booth is also provided with an air-wash exhaust system, a water pump, an exhaust fan, a paint tank, an air regulator, a spray gun and hose, an air compressor for operating the spray gun, and an explosion-proof electrical control system. Each booth has a completely automatic carbon-dioxide fire-extinguishing system.

How the Booths Operate

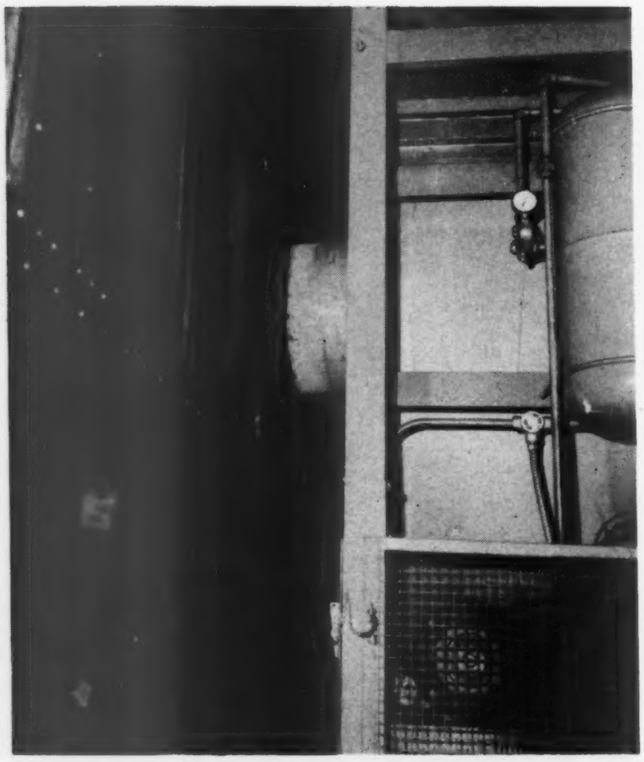
Here is how the traveling booth performs its "air-conditioning" functions. When the exhaust fans are turned on, a suction is created throughout the air-wash chamber on each side of the booth. As a result air enters the narrow space between the booth and the car, as well as through filtered intakes, and flows at a relatively high velocity along the periphery of the car and into the air-wash chambers, carrying with it all-over spray from the paint-spray guns. The air is cleaned of pigment in the air-wash chambers, and the cleaned air is discharged into exhaust pipes leading from the tops of these chambers. The exhaust pipes in turn discharge the cleaned air into a fixed, continuous exhaust duct suspended from the ceiling and running the full length of the building directly over the center line of the track.

The bottom of this duct consists of a series of pivoted louvers. As the booth moves along, the louvers are opened successively by cams on the top of the booth. Only enough louvers are lifted at a time to provide an opening in the continuous exhaust duct quivalent in area to the discharge ends of the exhaust pipes leading from the air-wash chambers. Separate exhaust fans draw the air through the fixed exhaust duct and discharge it into the outside atmosphere. The exhausted air is replaced in the paint shop by a single, centrally located air-replacement unit located on the paint-shop roof.

The development of the traveling-type spray booth by the DeVilbiss Company is the result of a demand for equipment that would provide greater overall efficiency than the fixed, conventional down-draft or horizontal-flow spray booth and which would entail less maintenance and less operating cost. In other words, there was a demand for equipment that would obviate the need for providing facilities for ventilating, exhausting, heating, air-washing and lighting the entire volume of a sheet metal room 100 ft. long by 20 ft. wide by 19 ft. high while two men are spray-painting a passenger car. The objective, therefore, was the development of equipment that would permit these functions to be concentrated in the relatively small area where the actual painting is going on.

The time required to finish a car depends entirely upon the number of coats of paint, color combinations and decorative stripes required. This booth is set to travel the length of a car in approximately seven minutes. For

In the working space on each side of each unit is a power-operated scaffold which, at the touch of a button, can be raised or lowered to the proper height. Shadowless lighting is provided by four banks of explosion-proof fluorescent light fixtures behind the painter



When spray painting car interiors, an exhaust extension is placed between an air-wash chamber of one of the traveling booths and a car window. Suction of the exhaust extension causes air to flow through the car interior and keep spray-gun spatter from the painters' faces

instance, in painting a car one color, giving the roof two coats and the body one, it is necessary for the booth to travel the length of the car five times—once for the application of each roof coat, two for painting the sides, vestibules and end sheets, and once for painting the steps, boxes, water-tank casings and battery boxes—a total of 35 min. in actual movement of the booth.

The traveling booths are also used to exhaust air while passenger-car interiors are being spray painted. This is done by spotting a booth at about the center of a car and extending an auxiliary exhaust pipe from a water-wash chamber into a car window. The suction of this pipe when the exhaust fans are turned on causes air to flow from opened end doors, through car interior to exhaust extension pipe and thence into the water-wash chamber.

The Pullman Company has found that the traveling booth has a number of advantages over the conventional type. One of the most important of these is the fact that, in paint shops similar to the Pullman Company's, the traveling-type booth requires only about a third as much replacement air as would a conventional fixed booth. This results in a substantial fuel saving in the winter.

Another advantage claimed by the manufacturer and the Pullman Company for the traveling booth is that it saves floor space. Each occupies an area of only about 228 sq. ft. as compared with 1,900 ft. for an equivalent fixed booth. This results in more room and light in the shop and more effective supervision of the painting operation.

Moreover, the traveling-type booth is found to provide much greater flexibility in painting operations than the fixed booth, requires fewer lights, and eliminates the need for intricate sewer connections, drains and water lines, and expensive permanent scaffolding.

According to the Pullman Company use of the traveling type of booth operating on rails placed in the floor resulted in economies in the installation, as the building superstructure was not affected in any way. Further economies are being effected, it is said, in the operation of the new booths, through the savings in electricity and heat, in a reduction in the replacement of material and air hose, and in savings in the cost of cleaning and masking the booth surfaces.

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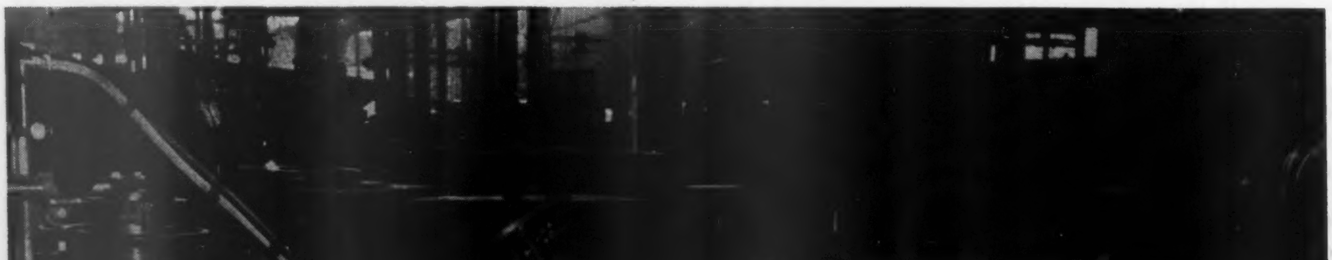


A flame-cutting machine setup that makes it possible to cut as many as eight 12-ft. diameter tank head blanks at the same time. The time required to cut the blanks for dished heads from stacks of eight ¾-in. thick steel plates has been halved by using two cutting blowpipes at opposite ends of the boom. The actual speed of both blowpipes is 5 in. per min. An Oxweld CM-16 portable cutting machine has been equipped with a heavy arm and pivot point. The hose block in the center is mounted on a swivel to prevent the hose from being twisted. This installation was made at General-American Transportation Corporation, Sharon, Pa.

QUESTIONS AND ANSWERS

Diesel-Electric Locomotives*

FUEL-OIL SYSTEM

339-Q.—What controls the pressure of the fuel supply as it is discharged from the pump? A.—A regulating valve maintains the pressure at 35 to 40 p.s.i..

340-Q.—What protects the system from overload? A.—The oil passes by a pressure relief valve set for 75 p.s.i. to protect the booster pump, motor and system from overload.

341-Q.—What is known as the pressure side? A.—b... tween the booster pump and the pressure regulating valve.

342-Q.—Describe the flow of oil further. A.—Oil then passes through a filter into the right bank fuel header.

343-Q.—What is fed from the right bank fuel header- A.—The fuel injection pumps on the right side of the engine.

344-Q.—From the right fuel header, where does the oil flow? A.—The oil crosses over at the generator end into the left bank header which feeds the left bank fuel injection pumps.

345-Q.—What serves to control the fuel oil pressure in both headers? A.—The pressure regulating valve, located at the end of the left bank header, controls the fuel oil pressure in both headers.

346-Q.—What instrument is ahead of this valve? A.—The line connecting to the fuel oil pressure gage on the engine gage panel.

347-Q.—What becomes of the excess fuel after completing the circuit? A.—Excess fuel is returned to the fuel oil storage tank through the pressure regulating valve which is set at 25 p.s.i.

348-Q.—How does the fuel reach the engine cylinders? A.—From the fuel inlet headers through individual jumpers to the fuel injection pumps. From the fuel injection pumps to the fuel injection nozzles (located in the cylinder heads) and through the nozzles to the combustion chamber of the cylinder.

349-Q.—Where is the emergency fuel cut-out valve located? A.—Near the fuel tank in the suction line to the fuel booster pump.

350-Q.—What type of valve is it? A.—A spring loaded valve similar in construction to a globe valve.

351-Q.—What is the normal position of this valve? A.—The normal position is open in which position it is latched.

352-Q.—What is the purpose of the emergency fuel cut-out valve? A.—To furnish a means of quickly shutting off flow of fuel from the tank in case of fire.

353-Q.—What must be done to close the valve? A.—It is closed by pulling the handle of the tripping yoke, allowing the valve stem to move downward and the spring then holds the valve to its seat.

354-Q.—Can the valve be tripped open at various places on the locomotive? A.—Yes, by pulling any one of the red knobs, 5 on the A unit of the road locomotive, 4 on the B unit, and 3 on the road switcher. These knobs are located at various places on the locomotive.

355-Q.—What is preferable in case of emergency? A.—It is preferable, even in an emergency, to stop the diesel engine before tripping the valve.

356-Q.—When the valve is tripped, what indication would be shown on the engine control panel fuel pressure gage? A.—The indication should be zero pounds pressure.

357-Q.—How is the valve reset? A.—Manually by pulling up on the valve stem and resetting the crutch which holds the valve open.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives.

Steam Locomotive Boilers

By George M. Davies

Efficiency of Seam

Q.—In computing the efficiency of a longitudinal seam, why is the efficiency generally based on the pitch of the rivets on the outside row?—F.L.E.

A.—The efficiency of the seam is not generally based on the pitch of the rivets on the outside row but on the unit section of the seam, included in one rivet pitch on the outside row. As a rule the ordinary longitudinal seam is divided into a certain number of equal rivet pitches, for convenience in figuring only one pitch or section is considered. Therefore when the pitches are uniform throughout the length of the seam the efficiency of the seam will be the same as the efficiency of a unit section of the seam for a length equal to the pitch of the rivets on the outside row.

Why Grind Welds?

Q.—What is the purpose of grinding the welds of the longitudinal and circumferential seams of an all-welded boiler?—E.R.K.

A.—The purpose of grinding the welds of the longitudinal and circumferential seams of an all-welded boiler is to remove any external imperfections and to obtain a smooth surface to facilitate the x-raying of the weld.

Internal defects, determined with the use of the x-ray, can more readily be detected on a smooth weld properly ground than on a weld that is not ground.

Tubes Cracked Through Welds

Q.—We have recently increased the diameter of the boiler flues from $3\frac{1}{2}$ in. to 4 in. diameter. Is it possible that such a change could result in the fire cracking of

the tube longitudinally through the welds at the tube sheet?—D.E.D.

A.—The question does not give any indication as to just how the change from 3½ in. to 4 in. diameter flues was accomplished. The change no doubt resulted in the application of nqw tube sheets with the flue spacing increased to compensate for the larger diameter tubes.

A change in the tube spacing resulting in the crowding of the flues to the extent the water space between the tubes and flues is too close, so that small accumulation of scale on the tubes and flues will result in restricting the circulation of the water to a point where the heat from the firebox temperatures is not absorbed fast enough permitting the beads and flue ends to become overheated to the extent that the structure and ductility of the flue material is destroyed, can result in fire cracked tubes.

Date of Hydrostatic Inspection

Q.—In filing the Annual Locomotive Inspection and Repair report when the hydrostatic test on the boiler has been completed prior to the final inspection of the locomotive, should the actual date of the hydrostatic test be inserted in the report or should the report be dated back to the time of the hydrostatic test so that as a record the report will indicate the actual date of the hydrostatic test for future reference?—I.M.L.

A.—It has been ruled that the date on the Annual Locomotive Inspection and Repair report should be the date on which the inspection of the locomotive was completed and the locomotive ready for service and that this date would be accepted as the date of the hydrostatic test which was made as part of the inspection of the locomotive covered by the report.

Schedule 24 RL Air Brakes

Hauling Locomotive B Unit Dead In Train

1219-Q.—How is a B unit prepared for being hauled dead in a train?

A1.—Change dead engine cock (or change dead engine cap on the D-24 control valve); 2—Open brake pipe branch pipe cock to charge the D-24 control valve reservoirs; 3—Remove the S.A.-2 Hostler's brake valve handle in release position or secure it in that position; 4—Open the cut-out cock in the independent application and reease pipe under the hostler's brake valve; 5—Position controlled emergency cock in passenger ("P") position if used; 6—Close the cut-out cock to the N.S.-1 reducing valve.

1220-Q.—What precaution must be taken on the B unit to insure a release of the automatic brake?

A.—The B unit must have an atmospheric opening from the actuating pipe *13* and the independent application and release pipe *20* to insure a release of the automatic brake.

1221-Q.—What is the most positive method to insure this opening?

A.—The most positive method is to remove the air hose or pipe plugs from the dual connections.

1222-Q.—In this connection, what other pipe must be considered?

A.—The straight air pipe when used, must also be considered.

1223-Q.—How are the locomotive brakes then controlled?

A.—From the automatic brake valve on the lead locomotive.

Multiple Unit Operation

1224-Q.—How are the brakes controlled when two or more diesel A power units are operated together, all hose couplings coupled and end cocks open?

A.—From tbe leading unit.

1225-Q.—What must be done on all other A units?

A.—Close brake pipe cut-out cock, place K-2 rotair valve in Lap (or K 2-A in either "FRGT" or "PASS" Lap) and remove the brake valve handles.

1226-Q.—What must be done if the actuating and independent application lines (13 and 20), are not connected between the units?

A.—Rotair valve must be in "FRGT" or "PASS" position.

Double-Heading behind Steam Locomotive

1227-Q.—When preparing double-heading on a Diesel power unit behind a steam locomotive, what must be done first?

A.—Move the shifter lever (if included) of the brake valve to automatic (A.U.) position.

1228-Q.—What action should follow?

A.—Make a full service application, close brake pipe cut-out cock but leave the rotair valve in "FRGT" or "PASS" position depending on the service required.

1229-Q.—How are the brakes controlled?

A.—By the lead locomotive.

1230-Q.—Is emergency available on units other than the one in the lead?

A.—Yes. The engineman on the diesel unit can make an emergency application by moving the automatic brake valve handle to emergency position.

1231-Q.—What other control does the engineman on the diesel unit have?

A.—He can release the brakes on the diesel power unit by depressing the handle of the independent brake valve.

Brake Valve Position After Emergency Appication

1232-Q.—In what position should the automatic brake valve handle be placed after an emergency application originating from any source other than the brake valve in freight service?

A.—In Lap position.

1233-Q.—What should be the handle position if this occurs in passenger service?

A.—Emergency position.

1234-Q.—Why is emergency position specified in passenger service?

A.—This is the only position in which the brake pipe supply is cut off with electro-pneumatic operation.

Operating "B" Units With S.A.-2 Hostler's Brake Valve

1235-Q.—What should be done before separating, or closing cocks?

A.—Make a full service application.

1236-Q.—What should be done with the reducing valve?

A.—When ever practical, set the N.S-1 reducing valve at or near the brake pipe pressure carried on the A unit.

1237-Q.—What then should be done?

A.—Close the brake pipe and independent application and release pipe end cocks on both ends of the unit and part the hose.

1238-Q.—What action should follow?

A.—Open the cut-out cock under the SA-2 brake valve and move the handle into the application zone.

ELECTRICAL SECTION

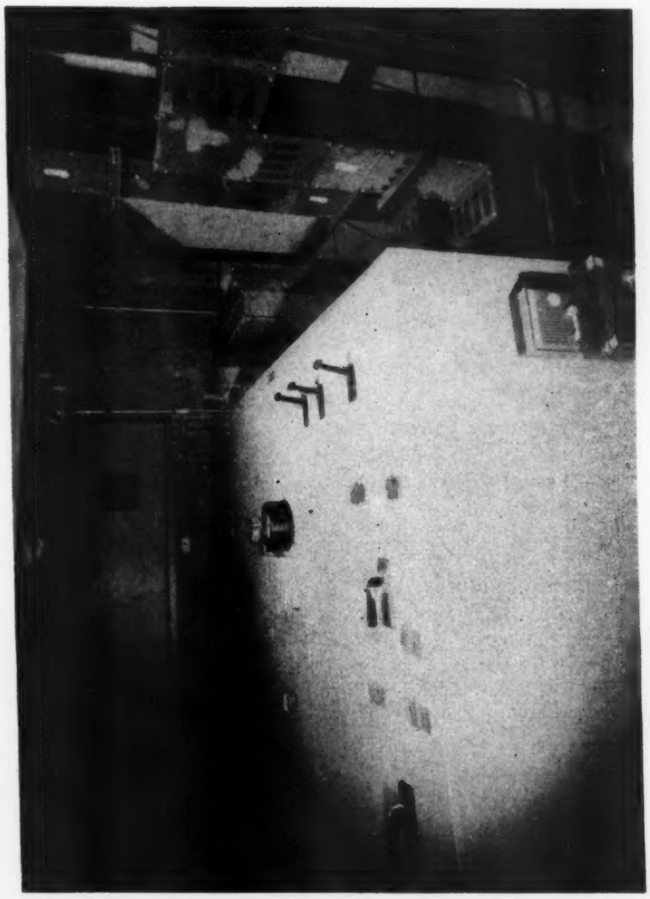


Fig. 1—Switchboard cubicle in vault under the station tracks

Standby Power for Passenger Cars

New Haven's installation at Boston is a fine example of electrical construction which has proved its usefulness

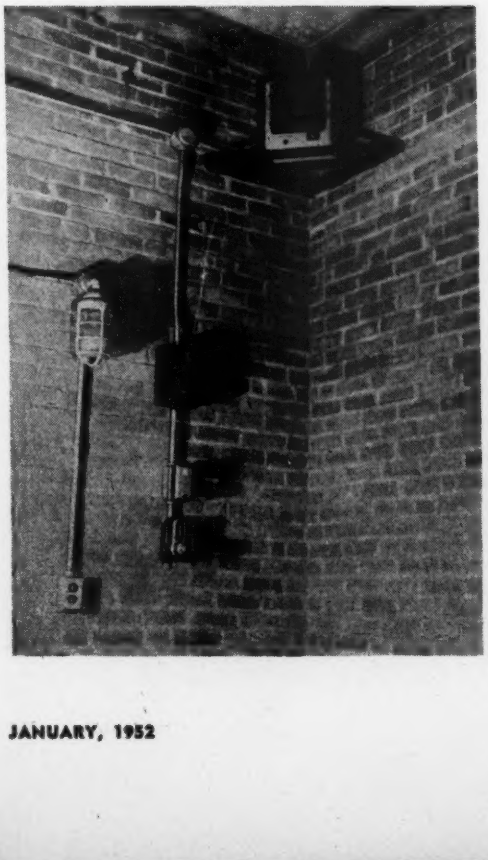


Fig. 2 (Left)—Heater and controls for maintaining suitable temperature conditions in the switchboard vault

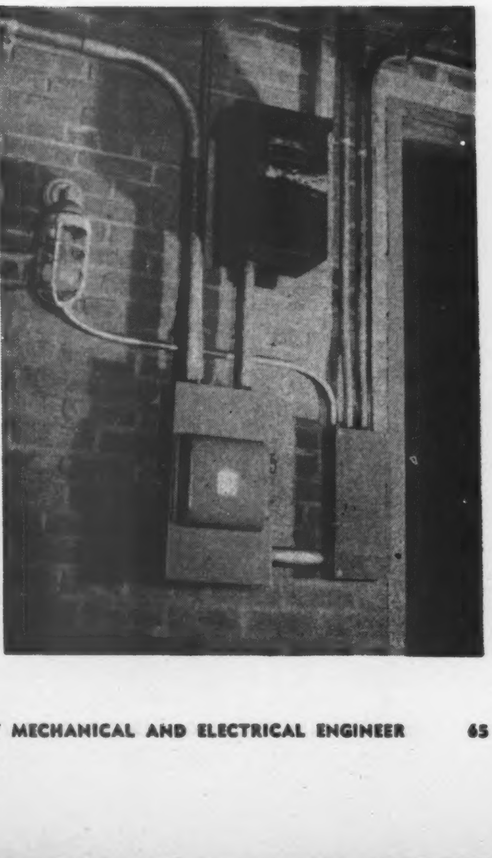


Fig. 3 (right)—Two power sources and a double-throw switch assure power for lighting in the vault

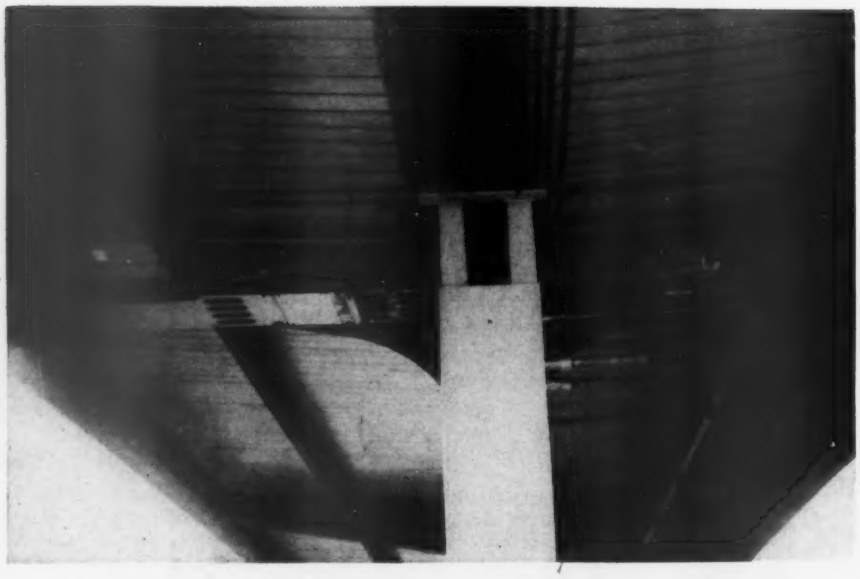


Fig. 4—Vertical ducts from the switchboard cubicle are carried inside a steel housing to the shed roof where they branch to run north and south respectively

To provide assurance that no car leaves South Station with a low battery and to pre-cool sleeping cars which are held in the station for the convenience of passengers, the New York, New Haven & Hartford installed a standby power system for three of its tracks in its Boston, Mass., terminal. The installation has now completed a year of service and has proved its ability to fulfill the purpose for which it was installed. Three-phase, 220-volt power is supplied to three of the 26 stub-end tracks in the terminal by 36 outlets spaced 80 ft. apart along these tracks, and there are also four outlets on one mail and express track at the eastern edge of the terminal.

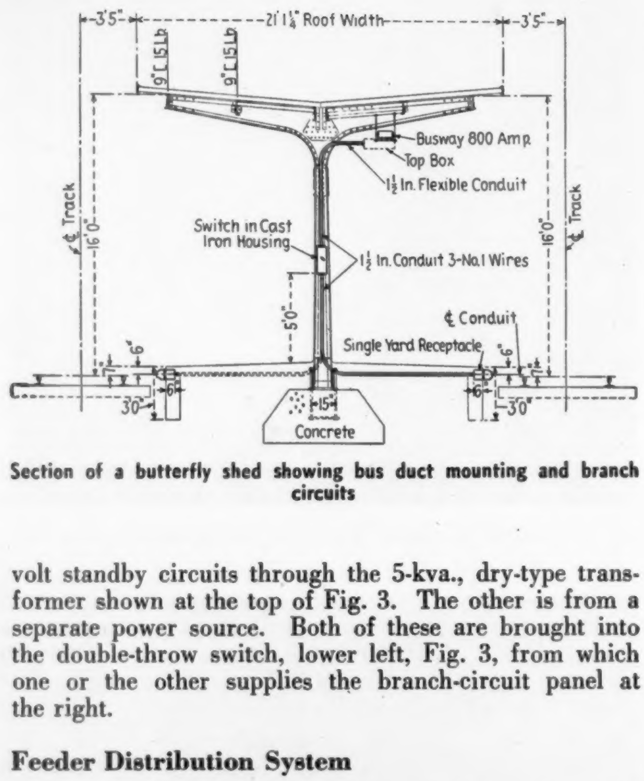
Power Supply

Power is purchased from the Boston Edison Company. It is brought in at 13,800 volts to a transformer owned by the utility, and located in a tunnel under the tracks. The transformer is in a vault behind the door shown at the rear of Fig. 1.

Power is purchased by the railroad at 220 volts, 60-cycle, 3-phase and is delivered to the railroad's dead-front switchboard, also shown in Fig. 1. The main 220-volt circuit is protected by a 3,000-amp. I.T.E. circuit breaker, and there are two 800-amp. breakers and three 400-amp. breakers for the branch circuits. The 800-amp. circuit-breakers control 800-amp. busway feeders, north and south, respectively, and run on a platform which supplies two tracks. Two of the 400-amp. breakers control 800-amp. busway feeders which run north and south respectively on a platform that supplies outlets on only one of the two tracks, and the fourth 400-amp. breaker controls the circuit which runs to the mail and express track.

To assure suitable atmospheric conditions for the equipment in the switchgear vault, there is a four-kw. Chromolux electric heater, equipped with a motor-driven fan, shown at the top of Fig. 2. If the temperature falls below 65 deg. F., a Penn Electric Switch Company thermostat at the lower end of the control circuit conduit will close the circuit to the heater. If the relative humidity exceeds 68, the Minneapolis-Honeywell humidistat shown just above the thermostat, will also start the heater.

To assure lighting in the switchgear and transformer valuts in case of a power failure, power for lighting is supplied from two sources. One of these is from the 220-volt standby circuits through the 5-kva., dry-type transformer shown at the top of Fig. 3. The other is from a separate power source. Both of these are brought into the double-throw switch, lower left, Fig. 3, from which one or the other supplies the branch-circuit panel at the right.



Section of a butterfly shed showing bus duct mounting and branch circuits

Feeder Distribution System

The 220-volt standby power is conducted from the main secondary switchboard cubicle in the vault in two 1,600-amp. Bus Ducts, each duct containing two 800-amp. buses. The ducts are run vertically to the underside of the platform cover shed where they branch two ways as shown in Fig. 4. They were supplied by the Marshall Company, Boston, Mass.

Where the 1,600-amp. Bus Ducts come through the platform, they are protected by a metal housing made of ¼-in. boiler plate with a minimum space of 2-in. between the housing and the duct. The housing is mounted on 3-in. by 3-in. angles. The duct is also supported at three points on these angles. The protection extends nearly to the roof of the butterfly shed as shown.

The means used for hanging the duct is shown in the drawing and also in Figs. 4, 5 and 6. These supports are on five-ft. centers. Branch circuits to the trackside out-

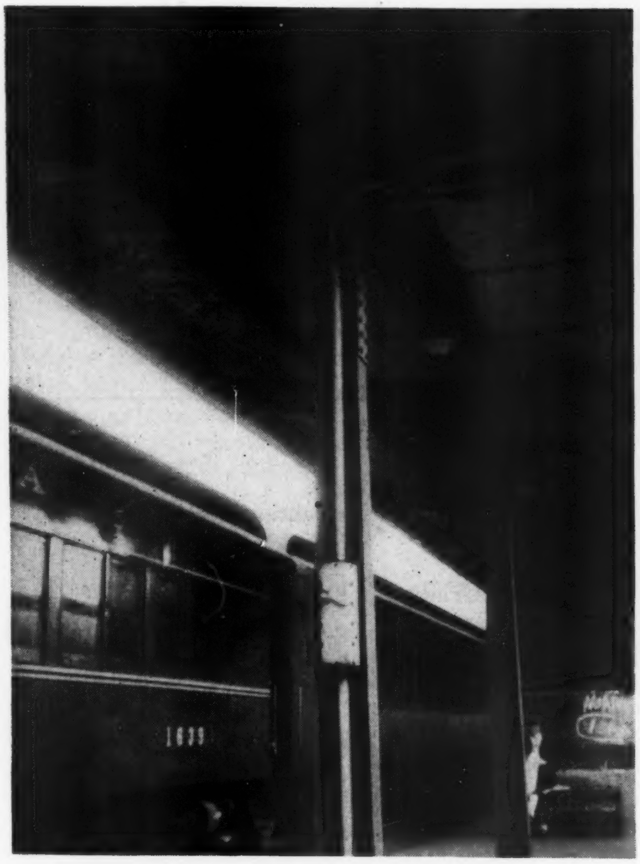


Fig. 5—General view of a platform

lets are made as shown in the drawing and in Fig. 6. These consist of three No. 1 rubber-insulated conductors in a 1½-in. conduit which is run down into the platform in the roof-supporting channel. A section of Flexspansion flexible conduit between the junction box and the rigid metal conduit allows for movement of the duct caused by thermal changes.

The branch circuits are protected by Westinghouse 100-amp., 3-pole, 250-volt De-ion breakers in Albert & J. M. Anderson cast iron enclosures placed in the channels at a convenient location for manual operation. These

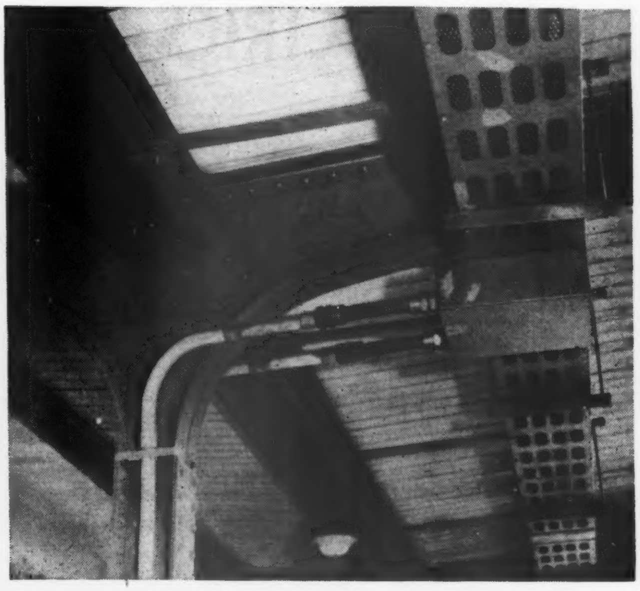


Fig. 6—A section of the duct showing a tap box and two branch circuit conduits

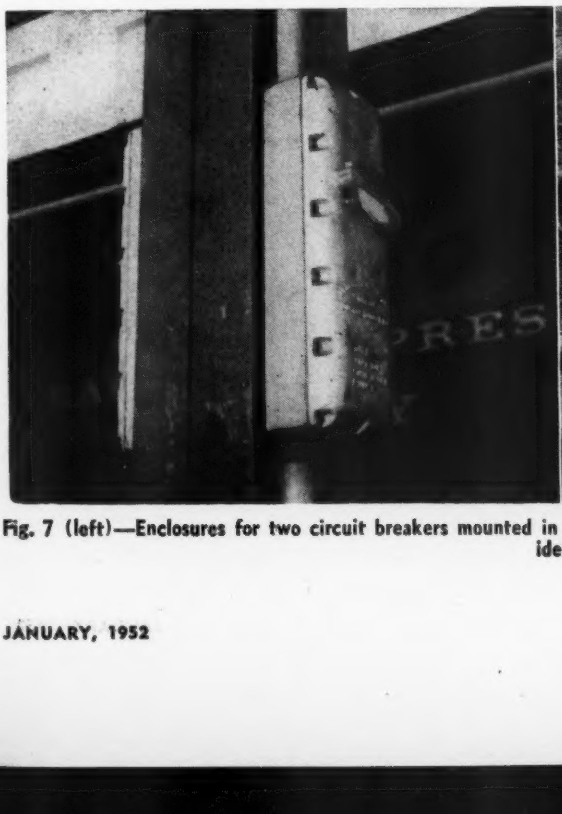
were chosen because they could be placed in the channels as shown in Fig. 7.

The branch circuit conduits are run through the concrete platform to Albert & J. M. Anderson receptacle boxes mounted on the edges of the platforms as shown in Fig. 8.

Portable cables used between the receptacles and the cars are Simplex type G neoprene-insulated cables. They contain three No. 2 power conductors and three ground wires connected together. All plugs and receptacles have four poles.

The distribution circuits described serve two tracks on opposite sides of one platform. There is a second platform equipped to serve a third track. Construction on this platform is similar to that described except that there is one instead of two branch circuits run from the Bus Duct. The capacity of the duct is sufficient to allow for serving of a fourth track should that become desirable.

The standby power system was designed and installed under the direction of F. A. Rogers, Engineer, Electric Lighting and Distribution, New York, New Haven & Hartford.



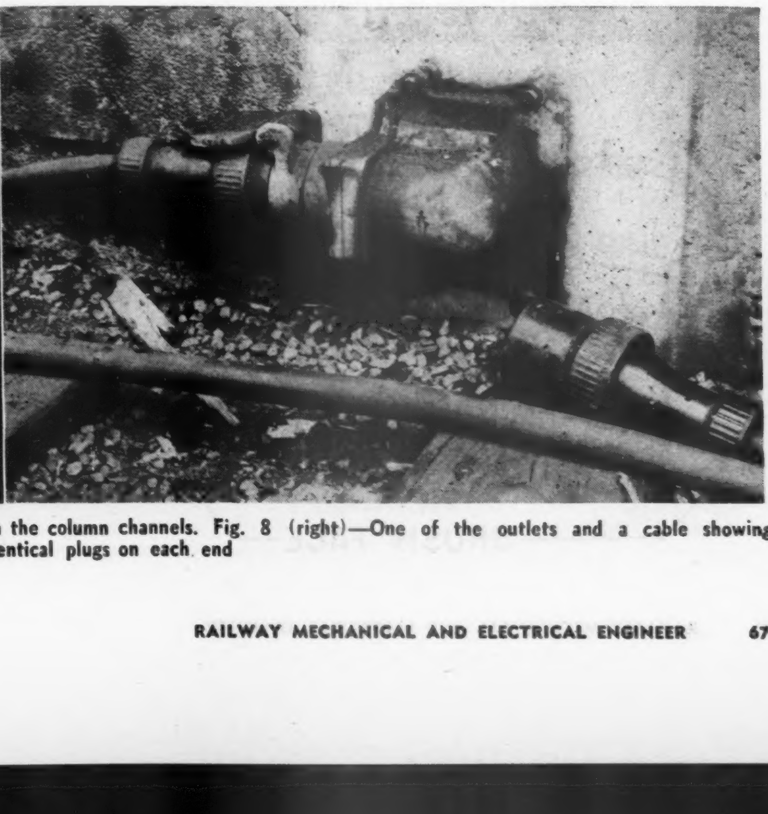


Fig. 7 (left)—Enclosures for two circuit breakers mounted in the column channels. Fig. 8 (right)—One of the outlets and a cable showing identical plugs on each end

DIESEL-ELECTRICS—How to Keep 'Em Rolling

5 Brushes and Brush Rigging*

Don't be deceived by the simplicity of a brush. It can cause serious trouble in fourteen different ways if it is not properly cared for

Brushes are simple looking things—just a block of carbon—but this simple appearance doesn't tell the whole story. Actually they do a mighty big job in passing large quantities of current through their sliding contact with the whirling commutator surface which speeds past them at a hundred miles an hour. This job is all done without oil or grease for lubrication.

Carbon is an excellent material for brushes. It handles the heavy currents without fusing or welding to the commutator when sparking or flashovers occur. It is readily molded into the right shape and can be treated to give soft, hard, or tough brushes. When the proper grade of brush is used, a very thin, glossy film is formed on the commutator. The brushes ride on this film. The advantage of this is that wear takes place in easily-replaced brushes rather than in the costly commutator.

There's More to It

Having a good material isn't the end of the story. If the hard-working brushes are to do their stuff, the maintainer must watch several things:

1. Grade and type of brush.
2. Commutator surface condition.
3. Brush holders.

Watch Your Grade

This important item is often confusing to maintainers. It isn't always easy to choose the right grade of brush for a motor or generator on a certain locomotive. From long experience, the builder usually recommends what he knows will give good results in most operations. Be very careful about changing that grade, or you may save pennies on brushes to spend dollars on commutator repairs.

A quick look at brush grades will give an idea of the effect of different brushes on your equipment.

(a) Soft brushes are usually very easy on the commutator. They quickly produce and maintain a good surface film. Their friction on the commutator is usually low, tending to keep it cool. Such brushes are recommended wherever they can be used economically. In applications where equipment gets rough service, they break or quickly wear and a stronger brush is needed.

(b) Hard, tough brushes, unlike the "softies," can take a pretty good beating before breaking. "Great!" you might say, "Let's buy hard brushes." Wait! Not only can hard brushes take a beating—they can also give one to the commutator, by bouncing and sparking at high speed.

Naturally, the alert maintainer wants to keep brush mileage high. If wear or breakage increases, he will be tempted to use harder brushes. What he really should do is try to find the cause of the trouble. Some common ones

*This is the 5th of a series of articles on maintenance of diesel-electrical equipment. It is written by J. W. Teker and J. H. Kathman, both of the Motor Engineering Division, General Electric Company, Erie, Pa.

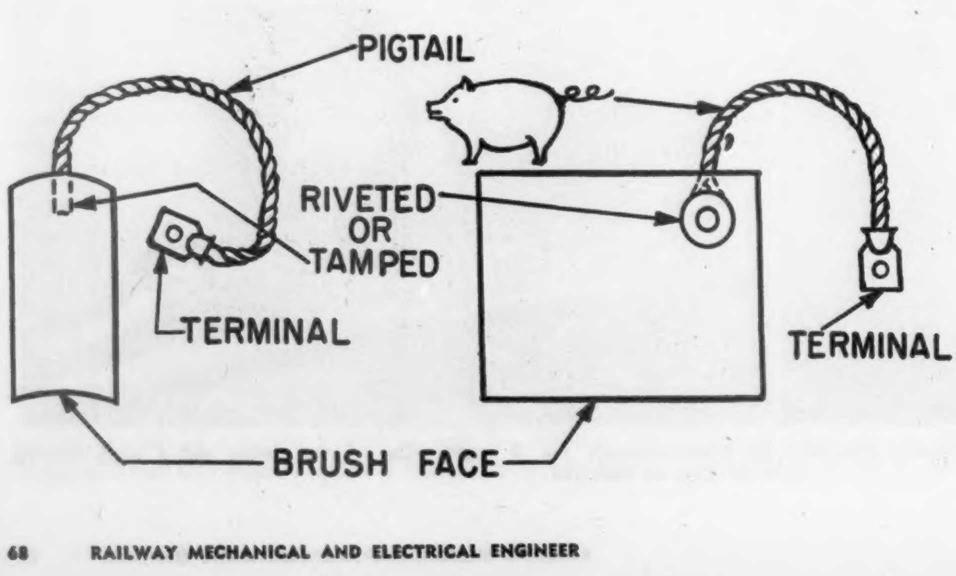


Fig. 1—Solid type brush

are wheel-slip overspeed, stalled motors, or abrasive dust in the air. Changing to very hard brushes might get him out of trouble today, but he would likely have to pay the penalty in damaged commutators later.

The best brush is usually a compromise between soft and hard grades. This gives many of the good features of both and gets away from some of the troubles just mentioned.

(c) Abrasive brushes, also known as "scrubbers," are sometimes used to keep a commutator surface clean. Unusual operating conditions may burn and dull a commutator surface beyond the point of self-recovery. The frequent stoning necessary to keep it in operation would take too much time. Here the mild, abrasive action of "scrubbers" will keep the job going. Of course, you will have higher commutator wear, so use "scrubbers" cautiously, and only as a last resort.

Besides the grade of brush, you must also think of its design. There are two main types: solid and duplex.

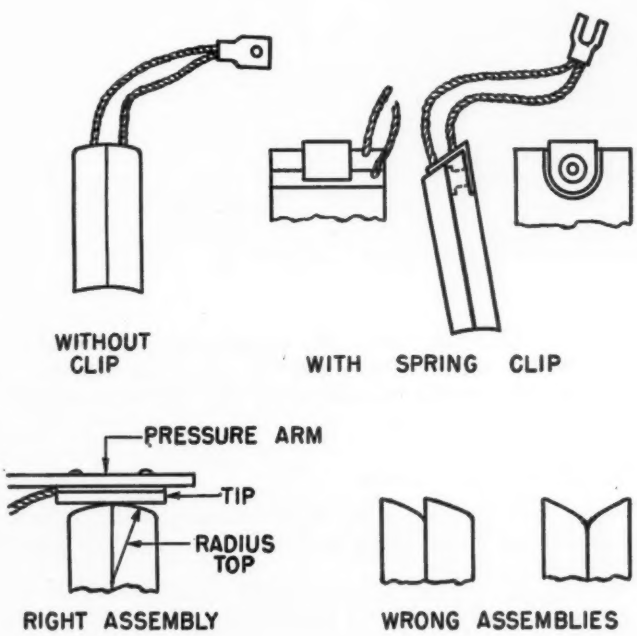


Fig. 2—Duplex type brush

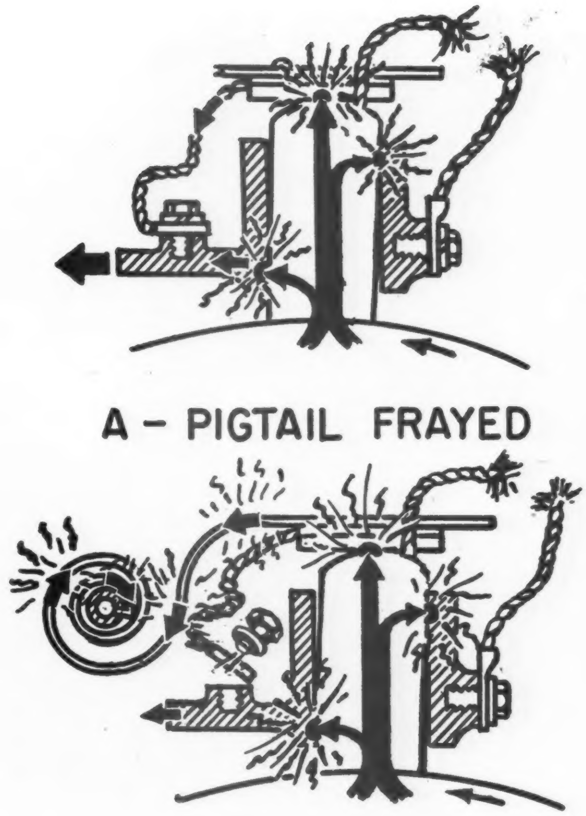


Fig. 4—Results of poor maintenance

The simpler solid brush, Fig. 1, is used wherever operating conditions permit. It has the advantage of low first cost and easy handling when replacing brushes.

The demand for greater power in a given size locomotive has meant increased duty on all parts, including the brushes. Greater commutator speeds, higher currents,

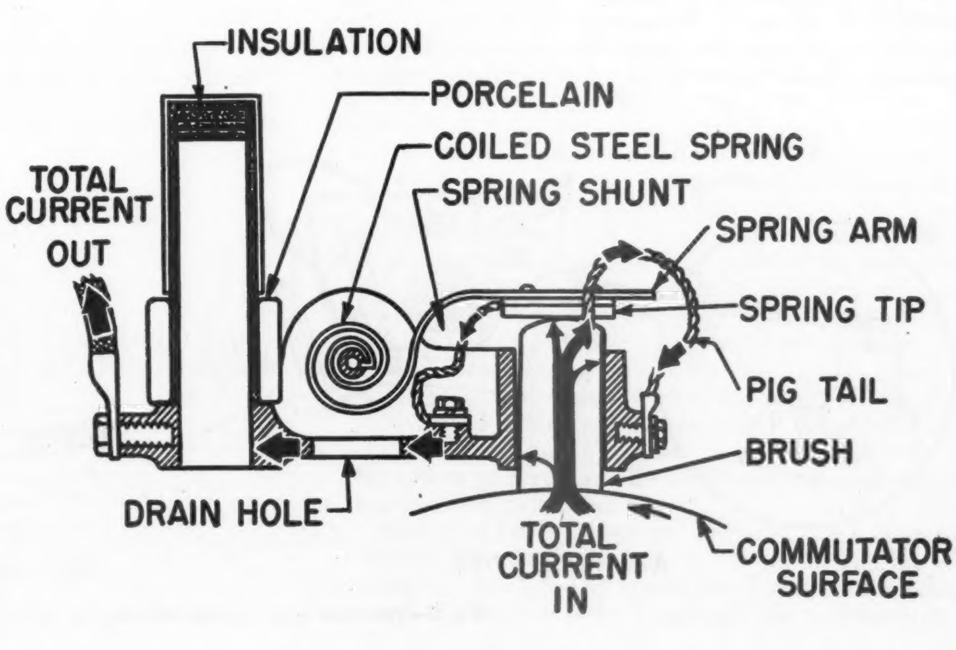


Fig. 3—Typical brush holder

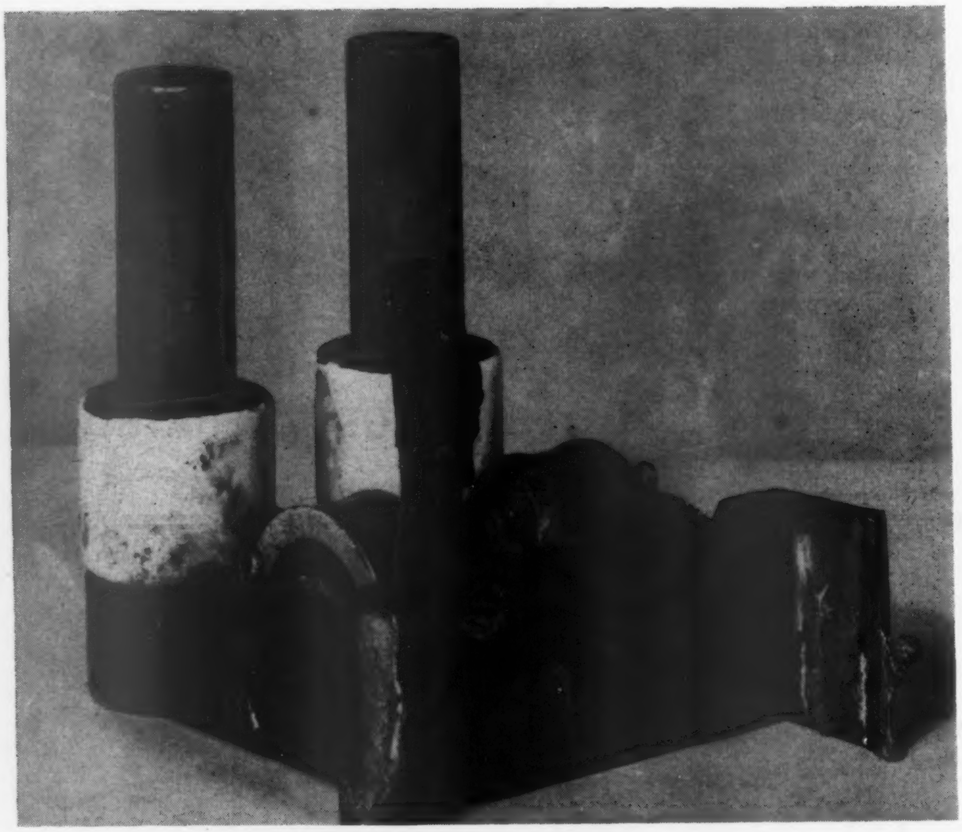


Fig. 5 — Neglect of proper maintenance of brushes and brush rigging may have serious results, as this melted traction-motor brush holder testifies

and tougher service have sometimes reached the limits of the solid brush. When this happens, commutator surfaces become poor and brush maintenance goes up. Here the duplex brush, Fig. 2, proves better.

Believe it or not, cutting a solid brush into two smaller pieces makes it do a better job of riding the commutator and handling the current. The duplex brush has a higher first cost and is a little more trouble to handle. It pays off, though, in lower over-all maintenance and greater reliability in heavy duty jobs.

Where Surface Counts

It's very important to keep the brushes on the commutator at all times. A bouncing brush hammers itself to pieces and gives the commutator and brush rigging a beating. Worse yet, it draws an arc at the commutator surface. This eats away the copper bars and makes matters even worse. Putting it the other way around—to keep good brushes operating properly—the commutator surface must be smooth.

The Rest of the Team

A good brush—like a big league pitcher—needs a team to back it up. The brush holder is this team. Its most important plays are to:

1. Get current into and out of the brush.
2. Keep the brush in the right position.
3. Keep the brush on the commutator.

Let's see how a typical traction-motor brush holder, Fig. 3, plays the game. Normally, most of the current is carried by the pigtail. A small amount may sneak out the side of the brush and get into the holder through the

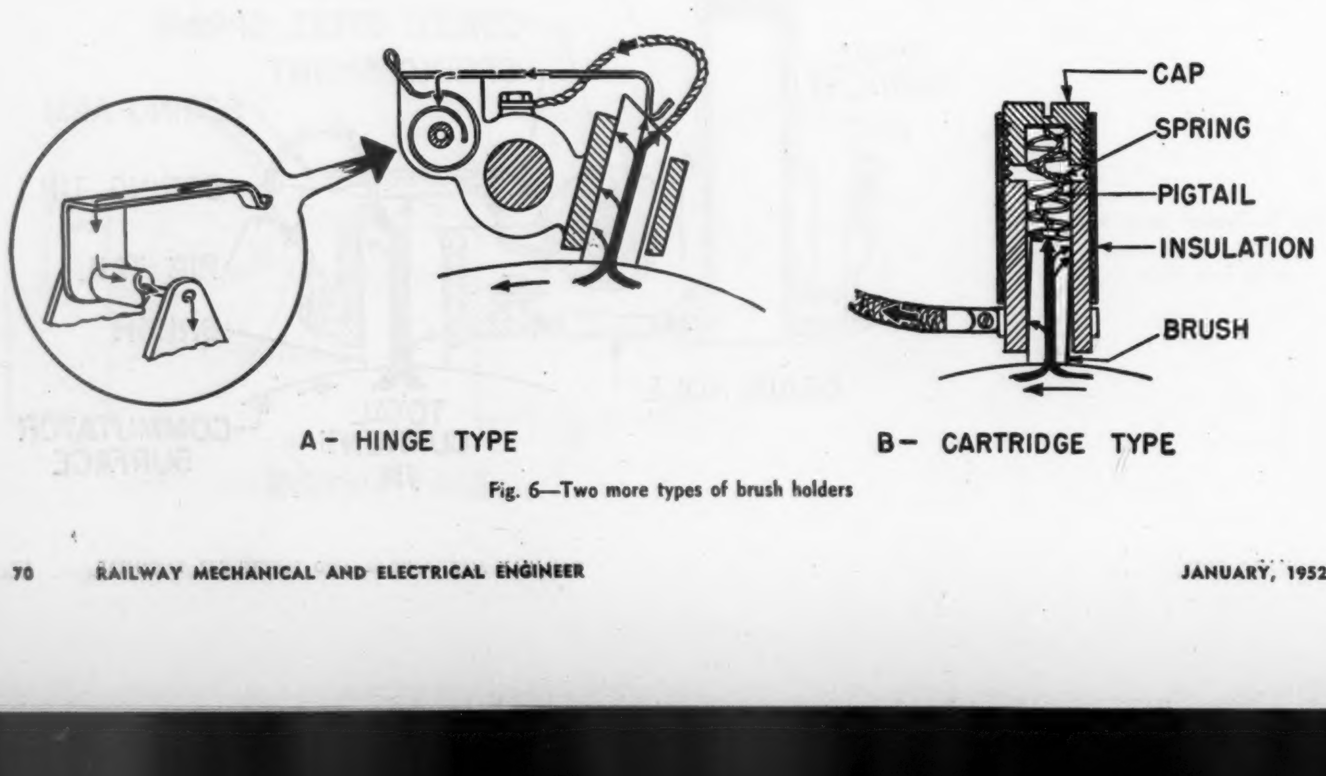


Fig. 6—Two more types of brush holders

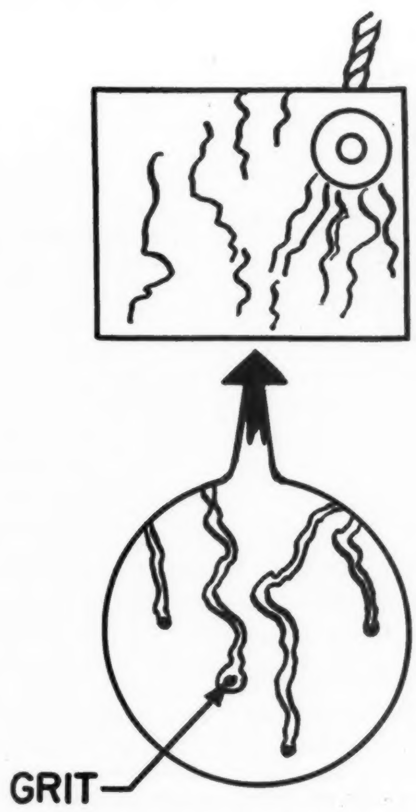


Fig. 7—Brush affected by grit

carbonway. More of it gets out of the brush top through the spring tip and shunt. But the pigtail carries the big load because it makes a good, solid connection between the brush and holder. In contrast, the brush makes only a moving, touching kind of contact with the spring tip and carbonway.

Sometimes the pigtail gets loose in the brush or may not be tightly fastened to the brush holder. Also, it may become badly frayed or broken. When any of these things happen, most of the current is forced to go through the carbonway and the spring tip and shunt. The moving contact of the brush with the carbonway and spring tip is poor and can carry only small currents. In easy service with low starting currents, a brush holder in this shape may get by without much maintenance trouble. But in hard service with heavy train starts, these poor contacts can get glowing hot, see Fig. 4. Giving a brush holder the "hot foot" like this is no good. Wear increases and repairs begin to pile up. Remember—a good pigtail connection is a mighty important link in proper maintenance.

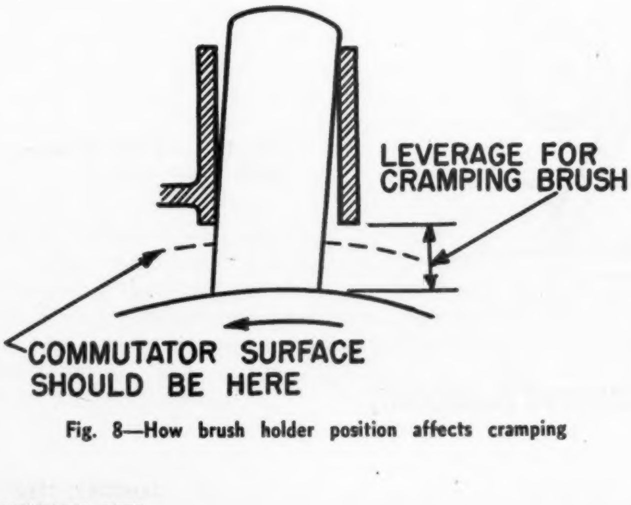


Fig. 8—How brush holder position affects cramping

The next most important current carrier is the spring shunt. If anything goes wrong with the pigtail, this acts as a backstop and carries most of the current, as in Fig. 4A. If the shunt stops carrying current, you are in for real trouble. This can happen by the shunt loosening where it connects to the brush holder, or by its getting frayed and broken. Then current will be forced to flow through the spring itself, Fig. 4B. Since the steel in the spring has a much higher resistance than the copper shunt, the heavy current flow makes it so hot that it loses its temper. With the spring out of commission, the brush can bounce on the commutator as much as it likes. This overloads the other brushes until they also fail. Then arcing between the brushes and commutator starts and a flashover may result. Worse yet—when trying to start a heavy train, it can melt off the brush holder, Fig. 5, and burn a hole in the commutator. Then you have a road failure.

You can usually bring a train in, even though a pigtail has failed, when the spring is protected. But if the spring isn't protected, you're in for trouble. Also, a loose pigtail waving around can do a lot of damage. If it touches the frame, it will ground the motor. If it drags on the commutator, it will cause a flashover. So you better see that pigtails and shunts are tight. Also, make sure that they are looped away from the brush spring so they won't wear and fray open.

Two other designs of brush holders are also used in railroad work, see Fig. 6. The first has the lever arm moving on a hinge pin and an independent spring. This arm offers a shorter and better path for stray current than the long, coiled clock spring. The second is the cartridge, or completely enclosed type, used for low power on small machines.

Position Is Important Too

The radial type of brush holder is used on machines, such as traction motors, that operate in both directions. It has a carbonway, or brush box, that holds the brush in a radial position on the commutator. The brush tilts slightly whenever the motion of the commutator reverses. Hence, the clearance between the brush and box must be kept as small as possible. When the box wears, the brush cramps and wedges itself. Not being free to follow the commutator surface, the brush then sparks and chips; the commutator is damaged and brush life is reduced. Electric pitting is one big cause of wear in the brush box, but abrasive dirt can also cause it to get sloppy in a hurry.

Sometimes dirt makes odd patterns on the brush, as shown in Fig. 7. This is often mistaken for electric burning, but actually it results from sand or gritty dirt between the brush and box. This dirt digs a worm-like path in the brush, and also wears down the walls of the box. Once you have closely examined such a case, you will never mistake it for electric action. Rather, you will start looking for a way to keep dirt out of the machine.

Worn brush boxes are not the only trouble caused by dirt. Sometimes oil gets between the brush and box where it mixes with dirt and forms a gum which sticks the brush in the box. The effect is the same as removing the spring pressure, and the brush gets stuck off the commutator and quits working.

One more important point. Be sure to keep the recommended distance between the brush holder and the commutator. Don't fail to check this if you are replacing a brush holder or have resurfaced the commutator. If

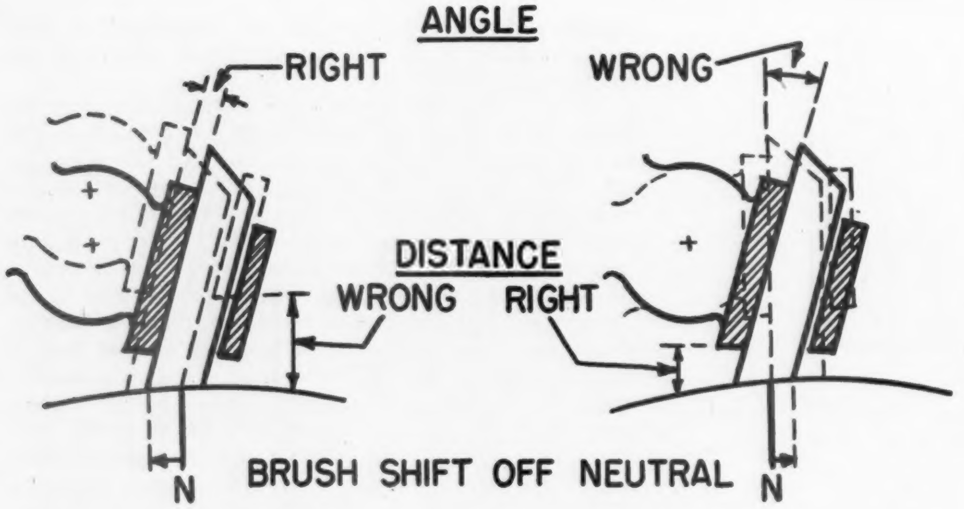


Fig. 9—Reaction type brush holder

this distance gets too great, the commutator surface drag will have enough leverage to cramp the brushes, see Fig. 8.

One-Way Running

When, as in a generator, the commutator always turns the same way, it is possible to use the types of brush holders shown in Fig. 9. These hold the brush against one side of the box to keep it from cocking and chattering. In the trailing type, the brush is held against the box by the action of the brush spring and the angle the holder makes with the commutator surface. The stubbing (leading) type, also holds the brush against one side of the box, but directs it against (instead of with) the direction of commutator motion.

The brush box clearance in this type of holder can be quite large because normally the brush touches only one side. This side must be flat to hold the brush steady. If it becomes rounded, the brush will tend to seesaw. This condition may be the result of wear or may be caused by careless cleaning of the brush box with sandpaper or a file. Of course, you cannot get a good contact at the commutator surface if the brush rocks back and forth in the box.

The angle of such brush holders is important. It depends upon the brush grade, commutator speed, spring pressure, etc. The builder fixes the angle to obtain the best brush operation. Whenever you remove brush holders for maintenance, be sure they are replaced at the proper angle.

Hold That Neutral Point

The brush holder angle must be watched for other reasons too. For best operation, brushes should contact the commutator at a definite point called the electrical neutral. Even though you can't see it, this point is a real thing—just like the timing of your auto engine. If the brushes are not at this position, the output of the machine will be affected. A motor will have its speed under load changed, and a generator will have its voltage affected. Brushes set "off neutral" will show up by sparking. This is particularly bad when one set of brushes is out of place in relation to the others.

You can get brushes "off neutral" in several ways. Suppose you set the brush holder too high above the commutator. Because of the angle, the brush will overshoot its proper position, as shown in Fig. 10. The same thing will happen if you let the brush holder twist on its stud. The wrong angle will throw the brush off, even if you get the distance right, see Fig. 10 again.

A jig is usually provided for setting brush holders at the right angle. Sometimes brush holder supporting studs are keyed into the frame and to the holders. Then

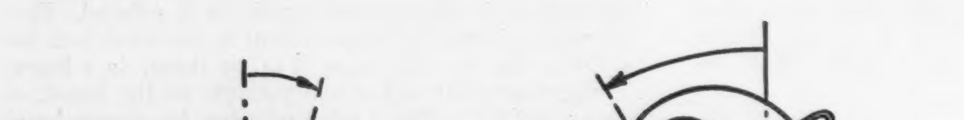


Fig. 10 — Effect of wrong brush holder position

you need only check distance to the commutator. Some machines have the brush rigging on a movable yoke or frame head. You should check this for the neutral mark or key to get the proper position. Many older machines used tramming tools and reference marks for setting brushes. Check this neutral position before you tear anything down so you will be sure to get it back just right.

Be Sure of a Good Fit

If you replace only one or two brushes at a time you needn't sand them in, especially if you are using brushes with faces prepared to approximately fit the commutator. Usually the other brushes will carry the load until the new ones get fitted. But, if you change a large number of brushes at once, you had better fit them, either by sanding or with a brush seater. When sanding, be sure the paper hugs the commutator surface. This will give a sharp fit right to the brush edge. If the machine runs in one direction only, pull the paper that way when finishing the sanding. This may seem like a fine point, but it shows you know the score.

Springs—Handle With Care

Another important thing about a brush holder: keep the right spring tension to hold the brush on the commutator. It should be nearly the same as the tension of its fellow spring in the next holder. If the spring tension in the brush holders varies a large amount, the current collected by brushes will vary also. If the differences are too large, some brushes will overheat and fail.

Tension is affected by wear in the spring mechanism, dirt between the hinge and shaft, and overheating of the spring. It is good to check spring tension occasionally, and to see that the springs are free from dirt or objects that might foul them.

Watch brush length too. If brushes wear too far, the springs will rest on some part of the holders. Then the brushes will be free to bounce on the commutator. Sparking will result that may cause a flashover or damage the commutator and brush holders.

A word of caution: when renewing brushes, either release the spring tension or use a tool for holding the spring. If a spring slips out of your fingers, it can deal a shattering blow to the brush. Even if it doesn't crack the brush right away, this tough treatment may show up later.

One More Play

Supplying the teamwork to back up the brushes is no simple task for the brush holder, but its job isn't over yet. It must keep itself insulated from the frame of the machine, yet be rigidly attached to the frame so that it won't vibrate and cause the brushes to chatter and spark. A megger will serve to check the insulating value of the holders. The only way to be sure they are tight is to get in there with your hands and feel them. Remember, more than once brush and commutator troubles have been caused by loose brush holders.

How It All Adds Up

Now, we've seen what each part does and how the brush and holder work together as a team. You, as the coach, can see to it that each part stays on the job to maintain a good score. Keeping this team running smoothly does much to prevent serious troubles, costly overhauls and road failures. So treat that little block of carbon with the respect it deserves.

Britain to Try 50-Cycle Electrification

British railways have decided to carry out a trial of the single-phase 50-cycle a.c. system of electric traction. The trial will be carried out on the Lancaster-Morecambe-Heysham Line, which was originally electrified experimentally in 1908 at 6,600 volts, 25 cycles, the equipment of which is now life-expired. By arrangement with the principal electrical manufacturers, various methods and types of equipment are to be tried out, and the overhead line voltage will be varied from the present 6,600 volts up to and including 20,000 volts.

This traction system is being considered for secondary lines, the recommended system for lines carrying heavier traffics being 1,500 volts d.c. overhead. It introduces special problems, but also several advantages, including the use of a lighter overhead system, fewer and simpler substations and the absence of power cables alongside the track. As a result of recent advances in technical development, it may now have a wider field of economic application.

This experimental electrification will provide experience of the suitability of standard frequency a.c. electrification for conditions in Great Britain.

Transformer Painting Kink—The operation shown in the illustration was developed in the Westinghouse Electric plant at East Pittsburgh, Pa., for painting the backs of transformer radiator tubes. It is used to supplement a paint spray gun because the gun cannot be maneuvered between the tubes, and th transformer shell, and its use is messy, incomplete and time consuming.

A strip of rubber gasket material is dipped in paint and used as shown to coat the backs of the tubes. The tubes get an even continuous coat, and the process saves paint and time and promotes morale by relieving the operator of an onerous job.


Left: Six steel work benches which expedite work at the Southern Pacific electric shop. Right: Details of one of the benches

Benches and Shelves for Control Equipment Repair

Among improvements in the Southern Pacific electrical repair shop at Sacramento, Calif., are six steel work benches especially designed for maximum convenience in performing the variety of intricate repair operations involved in maintaining small electrical parts, such as are used in various types of control equipment. Attention has also been given to the design of locker and shelf space for the storage of materials and of electrical parts which have been conditioned.

The first two work benches in the line-up are used for repairing air-conditioning panel units and thermostat controls; the third and fourth benches for cooling fans and blowers; the fifth bench for diswashers, Waukesha starters and expansion values; and the sixth bench for motor-alternators and ice air-conditioning pumps.

Each of the work benches is 36 in. wide by 37 in. high by 7 ft. long, and each is equipped with three swing drawers at the right, three shelves in a cabinet at the left, and three shallow shelves behind swing doors in the center cabinet underneath the bench top which is covered with linoleum. The sides are painted green with orange trim. A foot rest is provided at just the right elevation with respect to the stool. The swing drawers at the right and the door at the left may be locked. The lower two of the swing drawers are interlocked with the upper drawer, and the latter is equipped for padlocking.

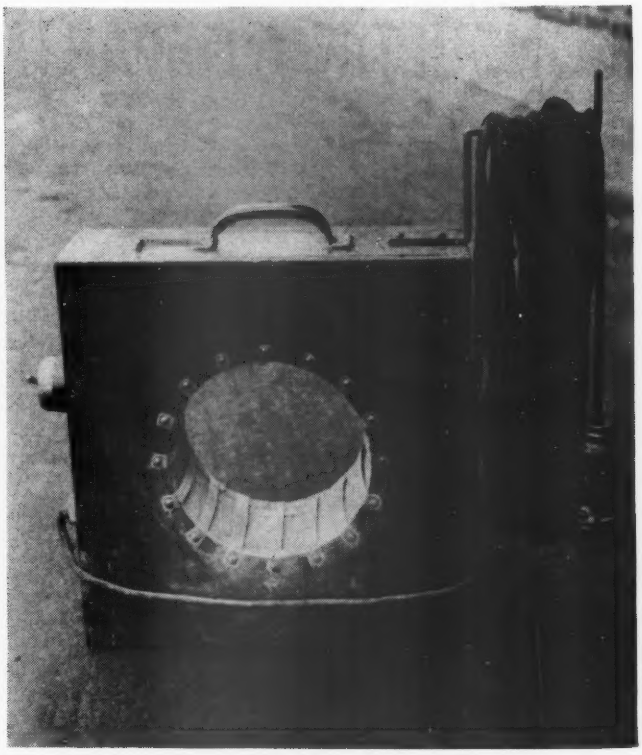
Wall space in the electric shop is utilized for cabinets


Left: Lockers with sliding shelves for storing materials and electrical parts. Roller ladder gives easy access to upper cabinets. Right: Repaired electrical equipment on sliding shelves

equipped with sliding shelves and trays of all sizes and shapes required to hold new material and repaired parts. A 42-ft. wall space is utilized for this purpose and equipped with double-deck cabinets 8 ft. high.

The lower cabinets can be reached from the floor, and a roller bearing ladder, suspended from a garage track at the top, and bearing against a steel side track at the bottom gives access to the upper shelves.

The shelves are made of 14-gage steel with a welded bracket on each side. Shelves intended for the storage of heavy parts are equipped with roller bearings.



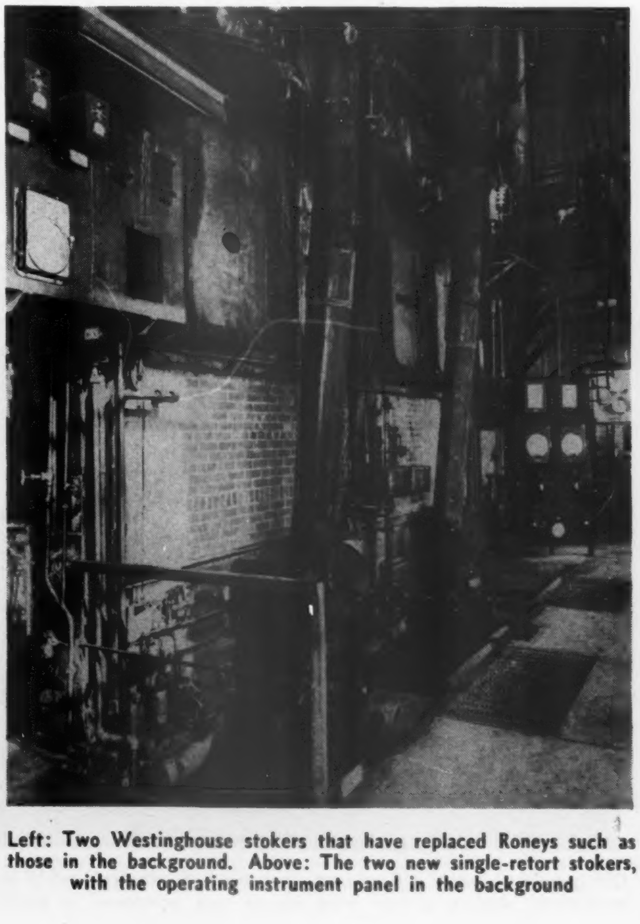
Journal magnetizing coil used by the Rock Island at Armourdale, Kans., for magnetic particle inspection of journals after they have been turned down to remove a cut condition. The box has 175 turns of No. 14 wire wrapped around the drum which slips over the journal. A pilot light tells when the current (110-volt a.c.) is on. The small steel bands protect the fiber core

Stokers for Pennsylvania's Pittsburgh Station

The Pennsylvania is modernizing its steam generating plant at the Pittsburgh, Pa., station by replacing four 50-odd-year-old Roney stokers with Westinghouse single-retort, side-dump, underfeed stokers. The plant supplies the electrical and steam requirements for the passenger station and yards.

The Roney stokers, natural draft units, required premium coal, whereas the Westinghouse single-retort stokers permit a wider selection of fuel.

In addition to this fuel advantage, the new stokers will increase the capacity of the boilers about 50 per cent. Although the Roney stokers could produce maximum boiler outputs of from 100 to 125 per cent of nominal boiler rating, the single-retort Westinghouse stokers will produce maximum boiler outputs of about 175 per cent of the nominal ratings of the boilers with which they will be used. The battery-set boilers, two boilers on a common wall, are 300-hp., straight-tube, longitudinal-drum units.



Left: Two Westinghouse stokers that have replaced Roneys such as those in the background. Above: The two new single-retort stokers, with the operating instrument panel in the background

CONSULTING DEPARTMENT

Diesel Electric Locomotive Batteries

Questions and Answers

Q.—What effect does it have on the rest of the batteries to replace an old cell with a new one?

A.—A new cell will have a higher Counter EMF than the old cell, due to aging of the older cell.

Q.—Is it a good practice to make up a battery of trays of different age cells?

A.—No—only as an emergency spare.

Q.—Is it permissible to use taps from the battery for different voltage equipment?

A.—Tapping into the battery for lights will result in an unbalanced condition of the battery, causing cells included in the lighting tap to be lower in voltage and gravity than the balance of the battery. It is far better to use the entire battery with resistance for the light load.

Q.—Is it best to use the rotating cell method when taking pilot cell readings, whereby a different cell is used for each reading until the rotation covers the complete battery?

A.—Yes. It is recommended that pilot cells be changed once a month.

Q.—If abnormal conditions are found, should the battery representative be called?

A.—Yes.

Q.—Is there any difference in life on locomotives which operate continuously with the same side of the locomotive to the sun between the two halves of the batteries?

A.—There may be a small difference, but the difference is so slight that it is doubtful whether this will ever become a factor in the life of a storage battery.

Q.—Will wood or monobloc trays be more satisfactory?

A.—The monobloc tray gives more satisfactory service, in that the electrolyte does not affect the rubber trays.

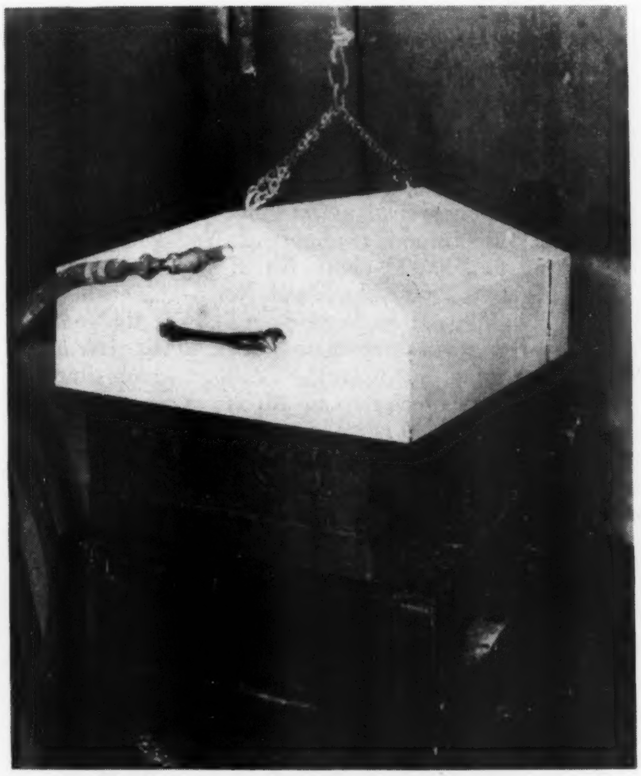
Can you answer the following questions? Answers should be addressed: Electrical Editor, Railway Mechanical and Electrical Engineer, 30 Church Street, New York 7.

The tester for G. E. diesel locomotive governors, developed by the Erie, and described in your December 1951 issue provides a simple and quick way of making tests. But, is it complete? Are there not other checks which need be made to insure satisfactory operation of the governor?

We got a "Megger" instrument reading on a locomotive of 30,000,000 ohms (30 meg.) with a 500-volt d.c. Megger. Then when we tried to hi-pot it, the circuit breaker kicked out at about 450 volts (across the hi-pot leads). With this same high megger reading on the locomotive, we tried an old bell ringer and the bell was quite loud. We measured the output of the bell ringer with a 1000-ohm per-volt voltmeter, and the voltage across the leads was only 100. Why would bell ringer ring so loudly when the resistance reading is so high? Is it true then that no matter how high the resistance is to ground, one is not sure the equipment will stand a high-potential test? This happened to us three different times on different locomotives. One time with a "Megger" instrument reading of 30, another of 20, and the third one of 15.

Old compound should be removed, the acid between seal should be neutralized, sealing surface dried before new compound is added

Upon removal from the jar or the tray, elements should be placed in a stone or rubber container and covered completely with water



Steam cover used to warm compound before removal and to heat space between covers and jars before pouring new compound

Q.—When wood trays become acid soaked, is it possible to prevent ground readings?

A.—The only way that this can be accomplished is to insulate the entire battery from the compartment.

Q.—What tools are recommended for battery maintenance and inspection?

A.—a. Hydrometer
b. Thermometer
c. Model 280—Weston voltmeter
d. See Gould maintenance manual—GB-748, page 22

Q.—In resealing a battery, does it hurt if some compound runs into the cell?

A.—Yes. This can cause active material to collect and bridge across from one plate to the other, eventually shorting out the cell.

Q.—Should you try to remove it?

A.—Yes.

Q.—Can you get a good seal by pouring new compound over cracks?

A.—No. Old compound should be removed, the acid between seal should be neutralized, sealing surface dried before new compound is added.

Q.—Should battery be heated before pouring new compound?

A.—The space between the covers and jars should be warmed.

Q.—How can you stop a leak in a monobloc container?

A.—It is impossible to repair a monobloc container and the entire container must be replaced.

Q.—What precautions shall be taken when trays or jars are broken to prevent damage to the elements?

A.—Upon removal from the jar or the tray, they should be placed in a stone or rubber container and covered completely with water.

Q.—Should spare batteries and spare trays be carried for emergency and in what ratio to the number of locomotives in service?

A.—Approximately one tray for every five locomotives.

Q.—Is it satisfactory to use a unit of a different capacity while the regular unit is being repaired?

A.—As a temporary measure this is satisfactory.

Q.—What good does it do to keep records?

A.—Records enable the battery manufacturers representative to review the operation and point out any problems which you might have or might encounter due to the type of maintenance. Naturally, records will enable you to get better battery life and performance.

Q.—What kind of battery records should be kept?

A.—Refer to Gould Record Card.

Q.—How often should a complete specific gravity and voltage reading be taken?

A.—A complete gravity and voltage reading should be taken every 30 days.

Q.—Is it important to record the temperature and height of the electrolyte when taking readings?

A.—Yes.

Q.—How often is it necessary to check every cell and how should this check be made?

A.—Specific gravity and voltage checks should be sufficient—every 30 days.

K. A. VAUGHAN
Gould Storage Battery Corporation

Cleaning and Testing of Locomotive Electrical Equipment*

Questions and Answers

Q.—Can traction motor overhaul periods be extended if the proper tests are applied to determine whether or not it is in need of an overhaul?

A.—It is recognized that bearings are the main consideration and reason that it is now impractical to extend overhaul periods. A motor run to check the bearings is not sufficient examination and a tear down inspection must be made at least every 300,000 miles. Test motors are being run to higher mileages, but these tests are very limited and carefully controlled. The point is that, if a motor is torn down for bearings, it is considered practical to then give it a dip, and bake, and regular processing, and thus there is now little need for more complicated tests to tell whether or not the motor requires a tear down; also, there is doubt as to whether any kind of test would determine whether or not the banding wires are tight; however, looking to the time that bearings can be run to greater mileages, such instruments as the ducter, high frequency machine, and surge induction tester, are being closely watched, and we are wondering how to evaluate these tests.

Q.—Is it practical to run with the ground relay knife

*Material presented by the Diesel Electrical Committee at the annual meeting of the Locomotive Maintenance Officers Association held in Chicago, September 17-19, 1951.

switch open in case of a ground known to be a moisture ground?

A.—The answer to this is an unequivocal "no" except where it is necessary to clear the main line. Also, personnel would not usually be available to determine definitely whether the ground is one of moisture.

Q.—What is the highest practical ground relay setting?

A.—This question seems to offer no particular problem and the manufacturer's recommendation is regarded as satisfactory, except to those railroads which regularly operate through severe winter weather conditions. Among these railroads, there is a growing feeling that the ground relay is more of a detriment than an asset, and that it either should be eliminated or adjusted to the highest setting practicable. One railroad is using a 3-amp. fuse in parallel with the ground relay coil on its passenger locomotives. Another railroad reports the following experience: Two passenger locomotives were equipped with a midpoint grounding system with approximately 60 ohms on each side of the midpoint. Normal pick-up value of the ground relay coil was 110 milliamperes. Theoretically ground pick-up could be obtained when a 9,000-ohm ground defect existed with a main generator voltage of 1,000 volts. On February 24, 1951, the tripping value of the ground relays was increased to 500 milliamperes. With this pick-up value, a theoretical ground defect of 2,000 ohms would be required to pick up the relay. At this time, all four power plants had ground readings above 5 megohms. A trip made on February 25 demonstrated that the protection was still effective even with the ground relays set up as it tripped several times due to traction motor brush pigtails being broken, permitting them to touch the frame of the motor. After the defective brushes were replaced, no more trouble with ground relay tripping was experienced. The next pertinent observation came between March 14 and 16, when the two locomotive units were operated north without any trouble through severe snow conditions, which were causing ground relays to trip on other locomotives operating through this same locality.

When the test locomotive arrived at its home terminal after this trip, the general ground readings of the high voltage systems were as follows:

No. 1 engine 10,000 ohms
No. 2 engine 50,000 ohms
No. 3 engine 30,000 ohms
No. 4 engine 50,000 ohms

The grounds were not cleared and the locomotive was dispatched out in the next train on the same night, March 16. During this trip again very severe conditions were encountered, and no ground relay trouble was experienced. Upon arrival at its home terminal again on the 18th, the ground readings of No. 1 engine had cleared up to 200,000 ohms, No. 2 engine 1 megohm, No. 3 engine 400,000 ohms and No. 4 engine 300,000 ohms. As before nothing was done to clear the grounds and locomotive went out again on the 20th, arriving at its home terminal again on the 22nd, at which time the ground had further cleared up to: No. 1 up to 30 megohms, No. 2 up to 30 megohms, No. 3 up to 5 megohms and No. 4 up to 30 megohms. Another megger test made seven days later showed that all four power plants had cleared up to 50 megohms or better.

In other words, due to the ground relay tripping value being increased to 500 milliamps., the locomotive operated with full power through the most severe weather conditions with no trouble whatsoever even though the dielectric strength of the insulation at one time was as low as 10,000 ohms to ground. Further, the locomotive cleared itself up through its own heat and ventilation with no cost to the railway.

Q.—How should wheel slip relay be tested? Have you experienced a specific case of unbalanced motor field shunting resistors causing a false wheel slip indication?

A.—The wheel slip relay is an important device and should be tested regularly. The test should include the entire wheel slip circuit so as to detect any defective external wiring, bridging resistors, or connections. All committee members reported that they had had no cases of false wheel slip indications due to unbalanced shunting resistors, with the exception of two who each said they had had one case, and another who reported that all false wheel slips are caused by this type of unbalance and implied that it occurs to a considerable degree.

An American-built diesel-electric locomotive which has been in service in Algeria since 1946. Diesels continue to replace steam locomotives in Morocco, Algeria and Tunisia. Four new 1500-hp. diesel road switchers for Algeria and two for Morocco were recently delivered by the Baldwin - Lima - Hamilton Corporation, making a total of nearly 100 units for the three countries. Almost all of the 1,500 miles of main line are dieselized. The maximum speed of the Algerian units is 75 m.p.h. which is regularly attained by passenger trains on long tangents between Algiers and Oran. Diesels operated on the 300-mile line running from Oujda south to the Sahara desert are equipped with special rotary air cleaners

EDITORIALS

1951 INDEXES

The indexes for the year 1951 will appear as part of the April, 1952, issue of Railway Mechanical and Electrical Engineer. For the benefit of those who may wish to bind their copies, separate indexes will be furnished upon request.

A Watered-Down Freight-Car Program

The year 1951 was marked by a continuous struggle on the part of the Defense Transport Administration and the American Railway Car Institute to get steel enough in all components to attain the goal of 10,000 new freight cars a month set up by the D.T.A.

During October 1950 James K. Knudson, administrator, D.T.A., announced a program calling for the building of 227,400 new freight cars by June 30, 1952, with which it was contemplated that an increase in Class I railway freight-car ownership of 75,600 cars could then be attained. Later in the month the N.P.A. announced the establishment of a program to provide steel products in sufficient quantity during the first quarter of 1951 to build new freight cars at the rate of 10,000 a month. In this announcement, however, it was set forth that producers of steel are not required to accept certified orders under the program if received less than 45 days prior to the first of the month in which shipment of the steel is requested, unless the N.P.A. specifically requests that such orders be accepted.

On January 17 the N.P.A. issued an order establishing a procedure "to assure the prompt delivery of steel products needed for the production of new freight cars at the rate of 10,000 per month." But, before the end of February the N.P.A. advised steel producers that May allocations would reduce the new freight-car program to 9,000 cars a month. By the middle of March, expectations were revived that steel allocations sufficient to restore the output of 10,000 cars per month would be made for June. (Senator Thye, in a Senate speech on March 12, said that he had written Director C. E. Wilson of the Office of Defense Mobilization urging re-establishment of the 10,000-car program.) Actually, 308,000 tons of steel were allocated for June as compared with 310,000 tons per month allocated for new freight cars during the first quarter.

Late in May, a tentative program was announced which would provide for only 7,000 to 7,600 cars per month during the third quarter. This cut may have had some political repercussions and, early in June, Mr. Knudson announced an increase in the third quarter program made possible by adjustments in the steel allocation plan, the allotment of a "little more" steel (said by N.P.A. sources to be 11,000 tons) and the extension of "direct-assistance" arrangements for the procurement of castings which it was understood would step up the program to 9,500 new cars per month.

The fourth-quarter steel allocations contemplated continuing a production of 9,500 new cars per month.

For the first quarter of 1952 the N.P.A. announces a program of 24,200 new freight cars, but "because of an acute shortage of material," allots steel for only 21,200 cars. This is a program of 8,066 cars per month, with steel for only 7,066 cars per month.

In interpreting these allocations two facts must be kept in mind. First, the steel industry is not required to accept orders for steel placed less than 45 days in advance of the month of delivery, and, second, the lead time in the car-building industry is approximately 90 days. It is evident, therefore, that car deliveries are not likely to begin earlier than between four and five months following the actual placing of the orders for steel.

By comparison with freight-car deliveries during 1950 the past year shows a marked improvement. Approximately 95,000 new freight cars were turned out by the car builders and railroad and private-car line shops during 1951. In 1950 the output was 44,000. But compared with the goal of 10,000 new freight cars per month, the 1951 output shows a deficiency of 25,000 cars, and the increase in Class I railway freight-car ownership during the year was approximately 31,000.

The freight-car supply was inadequate at all times during 1951. Large shortages were reported during January to April. While shortages were less acute during the remainder of the year, substantial shortages were continuous.

If first quarter allocations are any criterion of what is in store for the railroads during the remainder of 1952, an increase of less than 20,000 cars will be attained by the Class I railroads during the year; there is little reason to anticipate an adequate improvement in freight-car supply. The easy reduction in bad-orders has been pretty well discounted during 1951. Car-miles per car day, tons per loaded car, and average net ton-miles per freight-car day all show marked improvements during the first three quarters of 1951 as compared with 1950 and offer little hope of ready improvement in freight-car utilization in 1952.

The major hope for an improvement in freight-car supply lies in the program announced by Mr. Knudson in October 1950 calling for the building of 227,400 freight cars by June 30, 1952, which, it was contemplated, would increase the Class I freight-car ownership by 75,600 cars.

Maintenance Costs Will Come Down

The things a diesel-electric locomotive needs to keep it running under all service conditions were listed recently by a railroad operating man in speaking before a group of automotive engineers. He said that things have to be arranged so that a man who, for the past 40 years, has shovelled coal into a steam-locomotive firebox can, with a few hours training, find trouble when it occurs, and correct it so the diesel locomotive will then proceed with normal operation.

Someone less sophisticated than the speaker might take that statement much too literally. This is not to say that the speaker had his tongue in his cheek when he made it, but instead was trying to tell what the railroads should have if they could have what they really wanted. In regular operating practice, there are very few things either the fireman or the engineman can do to correct trouble. They are not schooled to do such things, and operating requirements preclude their doing very much.

The situation among the maintainers themselves is still not as good as it can be. Many have been taught about the intricacies of a diesel-electric locomotive in the manufacturers' schools, and with the aid of the railroads' own schools and demonstration cars. The greatest obstacle arises when the subject is electrical. Even among the supervisory forces, a day in school with Ohm's law is a grueling experience. By the time the subject is carried along to the formula for parallel resistances, many of the students are in a state of great confusion.

The reason, of course, is that most of these men have a mechanical training and are without the background that makes electrical problems easy. Actually, they do a remarkable job of maintaining locomotives, even including electrical equipment. As one maintainer said to another, "I can shoot trouble all right, but I want to know more about what I am doing." Another replied, saying, "If I could shoot trouble, I wouldn't care if I knew what I was doing or not."

The answer to the problem is obviously continued education of the kind that is being carried on right now. The locomotives are running without a distressing number of failures, but it must be that trouble from electrical causes is greater than it should be. Certainly, if the present courses of teaching are continued intensively, a reduction in electrical maintenance costs can be expected.

NEW BOOKS

FUEL OIL MANUAL. *By Paul F. Schmidt. Published by the Industrial Press, 148 Lafayette street, New York 13. 160 pages, 6 in. by 9 in., bound in Fabrikoid. Price, $3.50, plus 40 cents postage Canada or overseas.*

Until recently the problems related to purchasing, storing and using diesel locomotive fuel were very largely confined to securing fuel oil which met the specifications recommended by the builders. As the quantity of diesel fuel used by the railroads has increased, other demands for the so-called "middle distillates," particularly for space heating, have also increased and an adequate supply of fuel meeting the builders' highly restrictive specifications is becoming less readily available. Modifications of these specifications to increase available sources of diesel fuels are becoming desirable, and a thorough knowledge of liquid fuels by all having to do with their purchase and use comparable with that long employed in the purchase of coal is becoming necessary. The Fuel Oil Manual, while not specifically dealing with diesel fuel, covers the entire range of fuels obtained by refining crude oil. The treatment is non-technical, but readily understandable and complete in its scope. The essentials of petroleum chemistry and refining processes are set forth briefly and various grades and types of fuel oil described. A chapter is devoted to each measurable quality of fuel oils and in it the method of determination and the scale of its measurement are described. The last nine chapters are devoted to problems partaining to storage and handling, including preheating of oils, sampling storage tanks, and the compatibility and stability of fuels when mixed in storage, the employment of additives, and others.

A TREATISE ON MILLING AND MILLING MACHINES. *Third Edition. Published by Cincinnati Milling Machine Company, Cincinnati, Ohio. 896 pages. 6¼ by 9½ in. Cloth bound. Price, $8.00*

This third edition of the Treatise on Milling and Milling Machines has been brought out to meet the needs of individuals in metal working shops, technical schools and universities. In this 896-page volume is included the accumulated experience of many years in the application of milling machine equipment which has been brought up to date by revisions and additions to the material published in prior editions. Like its predecessors the new "Treatise" describes, in a comprehensive manner, the most advanced types of applications, milling machines, milling attachments, cutting and cutting fluids as well as the design and types of fixtures used in tooling these machines for production.

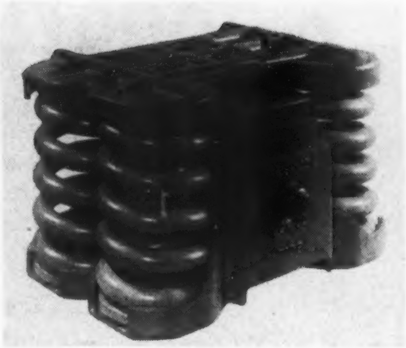
Included in the volume are 200 formulas for solving various problems encountered in shop practice and the text is further amplified and clarified by the use of 700 illustrations and charts. Throughout the volume numerous specific examples illustrate milling machine equipment in use in production, tool room and die-sinking work. These applications of milling machines to the manufacture of diversified parts in both large and small quantities have been brought together in this volume by the cooperative efforts of the publisher's engineering service department and industry at large. Tabular data, charts and information on milling-cutters and their use are based on metal cutting research, which, for many years, has been carried on by the Cincinnati Milling Machine Company's research department.

NEW DEVICES

Barber Truck-Spring And Stabilizer Unit

The Standard Car Truck Company, Chicago, has developed a new "Package-Group" spring and stabilizer unit for the trucks of existing freight cars and placed it on the market after more than a year of successful test service on Canadian railroads. Principal objectives sought in the design include adequate strength and wear resistance to assure a number of years of trouble-free service, flexibility enough to avoid excessive wear and breakage under heavy transverse shocks, and self-squaring and easy riding even on secondary track at speeds up to 80 m.p.h.

The unit is simple in design, using the increasing downward friction principle of Barber stabilized trucks, fairly light in



weight for ease of handling, and adaptable to spring-plank and spring-plankless trucks of all 40- and 50-ton types.

The entire housing and top plate are malleable iron of heavy section at all points of stress. Hardened wear plates are secured to the housing by bolts of ample size, nuts and lock washers.

The alloy friction shoes, designed for long life and high energy absorption, are cup-shaped partially to enclose the actuating alloy springs. They are forced against the wear plates by wedges similar in function to the wedge-shape pockets of Barber stabilized trucks. The load-carrying spring, with 2½-in. deflection and 5¼-in. outside diameter, will fit into spring-plank trucks as well as spring-plankless types, provision being made for the top plate to clear all types of bolsters.

The units are therefore well adapted to give old-type A.A.R. trucks an additional life with improved riding qualities for modern high-speed operation at much less than the cost of new trucks.

Electronically Controlled Car Heat

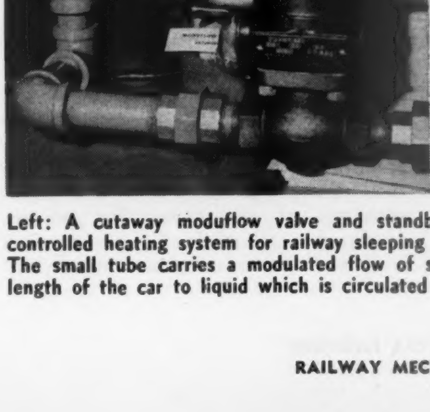
An electrically controlled heating system for railway sleeping cars, recently introduced by the Minneapolis-Honeywell Regulator Company, combines overhead and floor heat units to produce comfortable temperatures in the car under all kinds of outside weather conditions.

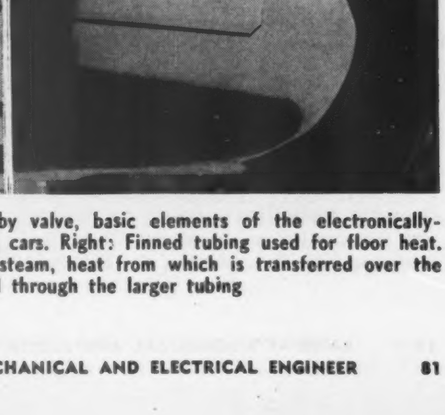
Electronic thermostats control a single moduflow steam valve for the car's entire heating and cooling system. The steam output from this valve is uniformly divided between the overhead and two floor heat systems. The principal function of the floor heat is to continuously counteract the effect of cold outside walls and windows. Its output is approximately equal to transmitted heat loss of the car. With this large portion of total car heat loss replaced, the overhead air can then be introduced at a temperature very close to the desired car temperature.

For individual car-room temperature control, a special booster system was developed. Basically, the booster system varies the discharge air temperature in each room to suit the passenger's individual preference. By adjusting a pneumatic switch, the passenger can regulate the flow of hot water through the booster coil and thus have direct control of the temperature of the air supplied to his compartment through the ducts. Positioning the pneumatic switch causes the overhead valve serving the booster to be opened or closed. Air pressure to the valve determines the valve opening and the amount of hot water flowing in the coil. Once adjusted, the room temperature remains stable regardless of changes in outside conditions.

Steam from the trainline passes through a reducing valve and is reduced in pressure before being used in the system. It is then metered to an overhead coil and the two floor heat surfaces by the moduflow valve. This valve surface distributes the heat over the full length of the finned floor heat surface. Even when they are operated in mild weather with low surface temperatures, their heat distribution is uniform. This is because of the use of the circulators and the heat exchanger principle of the moduflow surface. The car thermostat with its discharge and fresh air compensators operates through a panel to control heating with the moduflow valve. Cooling in summer is controlled by end switches, operating on the valve's overtravel movement, which turn on the cooling after the steam shuts off. The panel provides conventional switching and terminals for fan and other external equipment. A standby valve provides layover heat without use of the circulators.

From a point ahead of the moduflow valve, steam is taken off for the overhead booster system. The steam passes through a heat exchanger and heats water which is circulated through a closed system the full length of the car. The temperature of the water in the system is regulated by an insertion thermostat which positions a normally-closed steam valve to admit the proper amount of steam to the exchanger.





Left: A cutaway moduflow valve and standby valve, basic elements of the electronically-controlled heating system for railway sleeping cars. Right: Finned tubing used for floor heat. The small tube carries a modulated flow of steam, heat from which is transferred over the length of the car to liquid which is circulated through the larger tubing

In the air inlet to each room in the car, there is a booster coil. The hot water supply to the booster coil is proportioned by a pneumatic valve. Air pressure to the valve opening and the amount of hot water flowing in the coil. In each room, there is a pneumatic switch which the passenger can position to adjust the valve opening on the booster coil for his room. Thus, each room occupant can dial the discharge air temperature in his room for personal comfort.

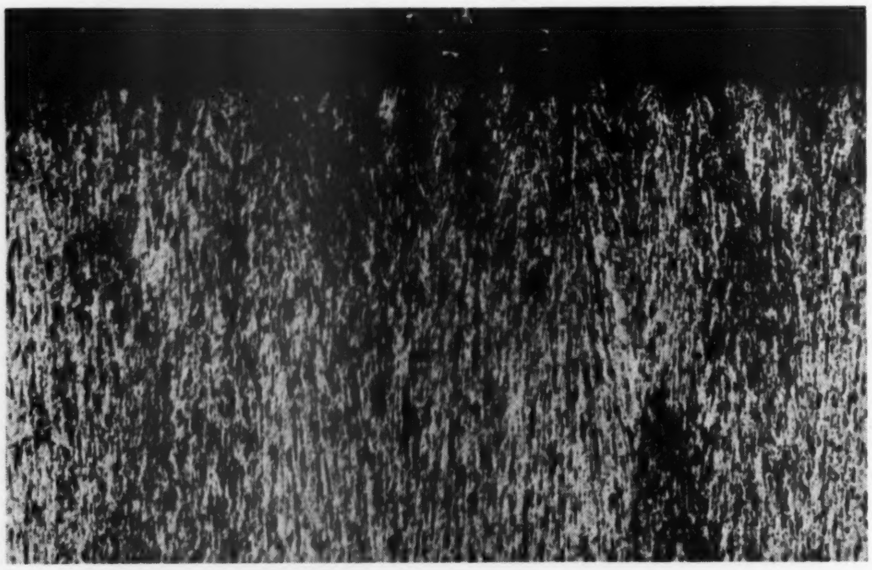
Electrodepositing Cast Iron

The van der Horst Corporation of America demonstrated the application of the Vanderloy M process of electrodepositing cast iron to a group of business paper representatives at Olean, N. Y., on November 14. The process is employed in building up worn cylinder bushings, worn crank-shafts, and other worn machinery parts. The plant for its application, which has recently been placed in operation, is 60 ft. wide by 288 ft. long. Facilities include cleaning tanks, machining facilities for restoring concentricity of bores and bearings, and a production line of baths for preparation of parts and electro depositing the iron.

Vanderloy M is the result of a program of investigation of all known methods of electrodepositing iron undertaken by the van der Horst laboratories several years ago. The new electrolytic iron develops a fine columnar structure with the axis of the grains perpendicular to the surface on which the metal is deposited. The bond is established atomically between the Vanderloy M and the base metal and is indestructible. Failure occurs in one or the other of the metals, not at the bond.

The Vanderloy M bath is adapted to the plating of heavy deposits. Deposits can be made of ¼ in. or greater radial thicknesses with neither grain growth nor roughness. The bath is stable and produces these results within practicable limits of current density and working temperature, low enough to permit masking of parts by application of low cost wax.

Applications for the new Vanderloy M plating process so far developed have come largely from users of the original Porus-Krome process now employed extensively on wearing surfaces of new and reconditioned diesel locomotive cylinder sleeves. Used with the Porus-Krome process, the economic limitations on thickness imposed on chrome plating are extended so that parts can be reclaimed after much greater wear than is practical with Porus-Krome alone. Restoration is effected by a heavy deposit of iron surfaced with a light deposit of chrome.



A cross-section of Vanderloy M showing the columnar structure — 100X

Parts are received at the far end of the floor, are cleaned and machined on the right side, and pass through the preparation and plating tanks at the left, from front to rear

Hot-Spray Freight-Car Paint Process

Hot-spray application of freight car finishes was inaugurated on November 28 at the Michigan City, Ind., plant of the Pullman-Standard Car Manufacturing Company, by the Sherwin-Williams Company, in a demonstration witnessed by a party of railway officers and supervisors and representatives of the press. The process, developed as the result of a joint research program of the two companies, utilizes heat instead of thinners as a viscosity reducing medium and employs a hot-spray freight car enamel developed by Sherwin-Williams.

In applying the S-W Hot-Spray Enamel a conventional primer is used prior to the hot-spray application. If desired, however, the primer may also be hot-sprayed, as this

Plan *Now*
For Your *Hard-to-get*
1952 Needs

JANUARY

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Analyze your requirements for maintaining that steam power still in service; Castings particularly for ...... superheaters, throttle parts, injectors, etc.

What about plant and shop requirements for small, compact, automatic steam generators ready to install and produce steam in three minutes? Perhaps larger capacity boilers and stokers are up for consideration?

This company designs and builds a wide variety of steam and component products ...ask for particulars.

THE
SUPERHEATER CO., INC.
Division of
COMBUSTION ENGINEERING-SUPERHEATER, INC.
200 Madison Ave., NEW YORK 16
Bankers Building, CHICAGO 3
Montreal, Canada, THE SUPERHEATER COMPANY, Ltd.

ELESCO

insures a more uniform primer viscosity under varying atmospheric conditions and reduces over-spray. The S-W Hot-Spray Enamel is a synthetic finish which contains a much smaller volume of thinners than is employed in conventional freight car paint; because of its higher solids content, one coat of the hot finish is applied instead of two coats of conventional paint. With this process there is better performance and control in application under adverse shop temperature conditions and, because of greater coverage per gallon and elimination of a second coat, utilization of paint-shop capacity and of spray equipment is increased. These factors, and the reduction in direct labor time of applying the finish, result in lowering the cost of overall finishing operations.

The hot-spray system was first applied experimentally in finishing 10 steel freight cars for the Chicago, Rock Island & Pacific in 1948. The hot-spray process demonstrates uniform coverage and hiding, eliminates crawling and blooming of the finish, and shows less tendency to orange-peel, sag or curtain. Commercial equipment for heating the enamel, and the primer if that is to be applied hot, are available from a number of heater manufacturers. Conventional type spray guns are used.

The hot-spray finish is being applied to a lot of 250 steel freight cars for the Rock Island; part of this lot were going through the shop at the time of the demonstration on November 28.

◆

High Vacuum Hand Pump

Three new industrial units, designed with safety as a prime consideration, have been made available by the Tokheim Oil Tank and Pump Co., Fort Wayne, Ind., for dispensing gasoline and petroleum base products and liquids such as water, glycerin, alcohol, turpentine and other solvents.

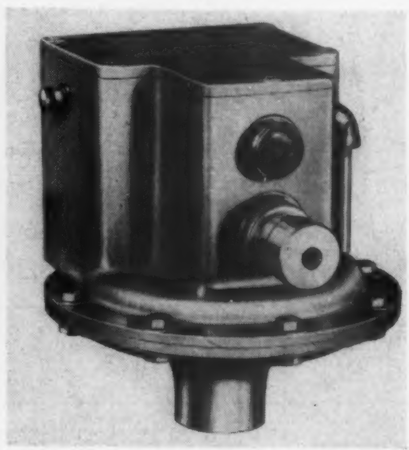
All models, Nos. 970, 971 and 972 have bung adaptors with a vise-type screw which can be tightened on the suction stub without wrench or pliers.

Model 970 has a non-drip discharge spout which simplifies filling cans and small containers. It has a baffle in the spout which permits expansion, but prevents the leaking of liquids when the pump is idle.

Model 971 is equipped with 8 ft. static wire hose and a vacuum breaker while the third unit is equipped in the same manner as the No. 971 but with the addition of an 8 gal. flow meter.

They can be installed in 1½ in. and 2 in. bungs of drums and tanks.

◆



Diesel Engine Protector

A device called the P-M Engine Protector, designed to help prevent crankcase explosions and excessive damage to engines caused by failure of internal parts, has been developed by Paxton-Mitchell Co., Omaha 5, Neb.

The unit operates on a diaphragm principle. When pressure is present in the crankcase, the diaphragm operates a relay which in turn operates the stop relay in the control circuit and automatically shuts engine down. Circuits are provided which operate the low lube oil alarm bell and isolates the unit. Thus, a shutdown of the engine will be effected before excessive damage can be caused by broken liners, pistons, rings or any other cause which would create pressure in the crankcase.

According to the manufacturer, the product can be used on all types of diesel engines. Because it is shipped as a packaged unit, complete and ready for installation with all integral wiring factory assembled, the installation is simple and can be made with a minimum of time.

The unit is sealed, eliminating the possibility of damage from water or cleaning solutions used in washing down the engine.

◆

High Strength Stud Wolding

There are many advantages to be gained by the railroad industry through the utilization of the Nelweld method of stud welding perfected by the Nelson Stud Welding Division of Gregory Industries, Inc., Lorain, Ohio.

The patented granular flux in the stud makes it possible to obtain instant ionization of the arc stabilizing ingredients in the flux. This results in maximum arc stability and in some instances materially reduces the welding power required. Complete dispersion of the flux over the end of the stud makes it possible for its deoxidizing elements to produce the most effective fluxing action for clean, oxide-free welds.

For box, refrigerator and special purpose car applications, this welding method has been used for side post and door post furring; car end and corner post furring; insulating cleats or nailing strips; perforated liners; securing insulation; hatch cover framing; placard and routing boards. Other applications include securing lading straps and attachments, stanchion brackets and luggage racks, diaphragm curtains, stiffeners and seats.

For the locomotive, there are several applications including securing side panels, smoke box doors, cable and piping, resistor mountings, storm curtains, air horns, covers and inspection plates. Other suggestions could be included as the listing is extensive.

◆

Flexible Shaft For Diesel Work

Flexible shaft tools have been in use in industry to a wide extent and in railroad work to a lesser degree for many years. They are popular with the operator because he lifts only the tool and not the heavy motor, thus avoiding fatigue. The rapidly increasing number of diesels has developed a need for flexible shaft machines in shops and enginehouses.

The Franklin Railway Supply Company, New York, purchased the Strand Company which pioneered the countershaft pulley and belt arrangement making three speeds available for driving the flexible shaft. A recent development is the Strandflex four-speed gear drive arrangement which em-

Hammered for maximum Strength and Toughness

This is the billet of steel 4-3/4" x 4-3/4" x 18-1/2" which is forged into this diesel connecting rod 3 feet long, weighing 84 lbs.

What a forging this diesel connecting rod is! Three feet in length (the average automobile engine's connecting rod is less than a foot long) weighing 84 pounds (against 4 pounds for the automobile connecting rod) it starts as a hot billet of steel 4-3/4 inches square by 18-1/2 inches long, which is hammered between two dies for seven different operations to form the completed forging shown.

Such a diesel connecting rod must stand terrific stresses and strains. It transmits the power from the explosion in the cylinder by way of the piston and piston pin to the crankshaft to the flywheel and thence to whatever the engine is driving.

Thousands of hammer forged connecting rods are working for you every day.

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS

ploys a quick-change gear drive providing four positive speeds.

The Strandflex drive features two sets of helical hardened steel gears running in lubricant. The selected gears may be engaged by a slight rotary and axial movement of the sleeve for any of the four plainly marked speeds.

With standard speed electric motor the speeds available are 850, 1,800, 3,600 and 4,500 rpm. Using a high speed motor the speeds are doubled so that the maximum is 9,000 rpm.

A full line of accessories is available so that the machine becomes a diversified tool to cover a wide range of every-day maintenance jobs.

Using proper wire brushes the machine is used for cleaning carbon from diesel parts such as pistons, cylinder liners, cylinder heads and valves.

Rotary files and cutters and shaped mounted grinding wheels turn it into a useful addition to the tool room and machine shop where it is used in jig and die making, deburring, rounding sharp corners and other similar jobs.

With sanding drums of various shapes and abrasive bands a wide variety of polishing jobs are done quickly and smoothly.

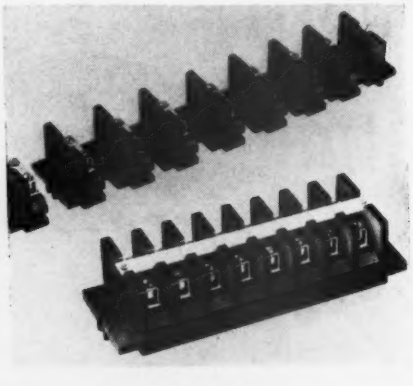
Shafts up to 30 ft. in length are available so that it is a practical machine for working on the high up car body parts of diesels and cars for grinding down welds, polishing and cleaning driving screws and setting nuts in grilles and cab panels.

Linestarter with Fusible Disconnect

A new combination across-the-line motor starter with fusible disconnect switch is available from Westinghouse Electric Corporation in N.E.M.A. sizes O through Z.

This starter, designated as Class 11-204-N, consists of a disconnect switch, main line fuse clips, and a Life-Linestarter mounted in a common enclosure. The disconnect switch is of an improved design, with visible blades and De-Ion arc quenchers. A self-indicating, slamproof handle is provided in the cover. It has separate positions of *ON*, *OFF* and *OPEN COVER*, and can be locked in the *OFF* position by up to three separate padlocks.

Enclosures can be provided for general purpose N.E.M.A. Type I, semi-dust-tight N.E.M.A. Type IA, dust-tight N.E.M.A. Type V, or N.E.M.A. Type XII. Starters are available for 3-phase operation, up to 600 volts, 60 cycles.



Terminal Blocks

The Wama Company, Industrial Building, Baltimore 2, Md., has developed a simplified solderless connector for its Add-A-Point terminal blocks.

The new connectors simplify terminal installations, and save manpower while assuring a better connection. They will accommodate standard wire sizes from No. 14 to No. 6.

The blocks are rated up to 60 amp. and will operate safely up to 750 volts. Each unit consists of a one-piece point and barrier, an end piece, marking strip and short screws. No through bolts, long screws or individual barriers are used.

Solvent-Vapor Degreaser

A completely redesigned and improved model of a hand-operated, solvent-vapor degreaser is announced by Detrex Corporation, Detroit 32, Mich. The production cleaning machines included in this new series, identified as VS-800, make use of non-flammable chlorinated hydrocarbon solvents, either trichlorethylene or perchlorethylene for the complete and high-speed removal of oil and grease from all kinds of metal products. The usual cycle of operation is vapor cleaning, then flooding clean solvent over the work with a hand held spray lance, followed by the usual pure vapor cleaning phase which is characteristic of solvent-vapor degreasing.

A minimum of floor space, lower working height, and an efficient new style solvent condenser are some of the improvements featured. As the clean-solvent storage tank is built integral with the main machine body, the new design has made it possible for the inside work space to be cleared of all projections, including the solvent collecting trough, condensing coils, and vapor level control bulb; thus providing unobstructed entrance for work being cleaned. Easy operation from either side of the machine is also made possible because of the relocation of the solvent storage space.

Further refinements include: simplified piping and water separator arrangement, large access door for easy cleaning of the solvent storage section, and a redesigned condenser coil that provides a greater volume of distillate for slushing. A standard heating-door opening is provided to accommodate the interchange of heating means, consisting of steam coils, gas burners or electric elements.

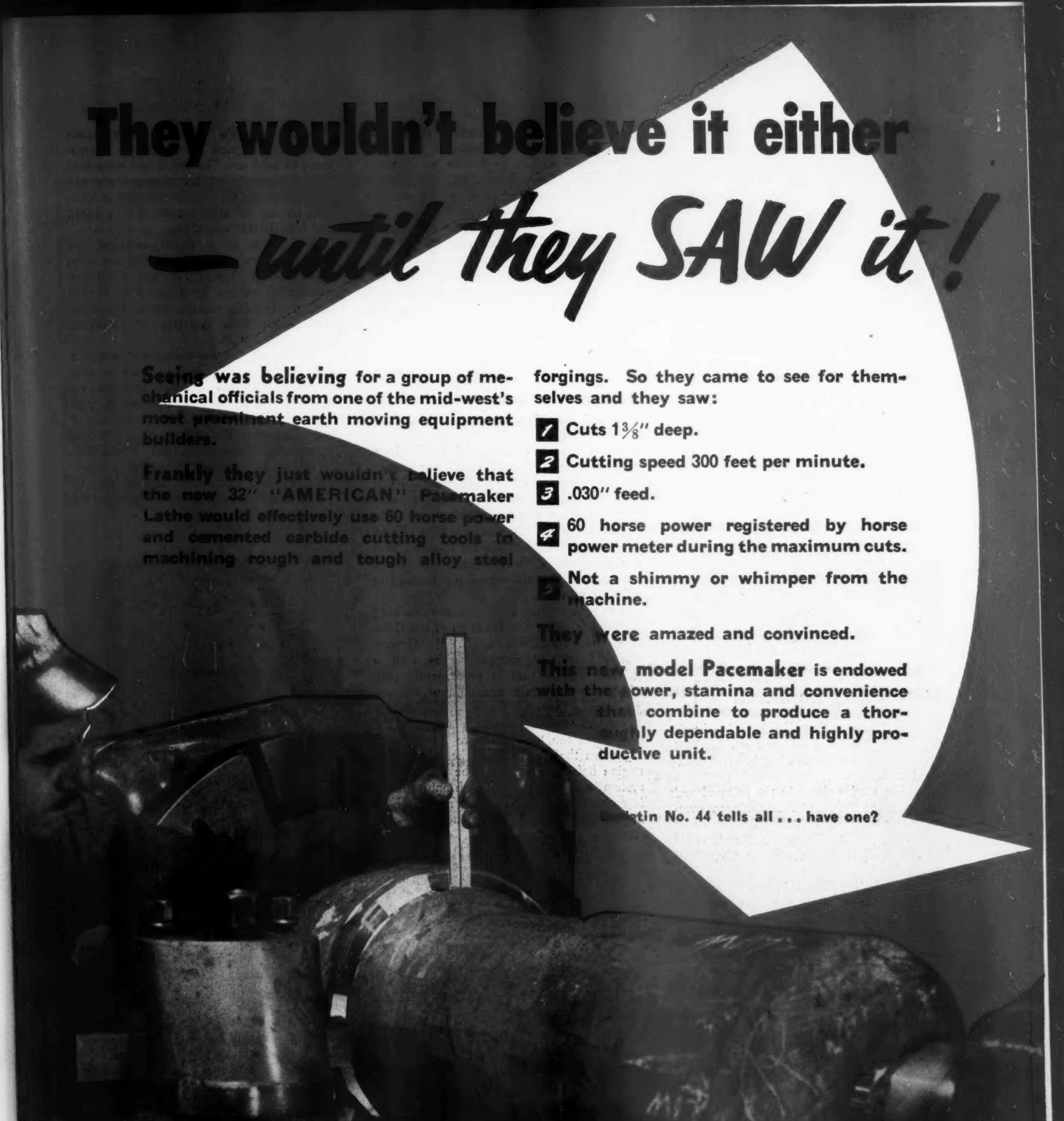
A new, improved type of corrosion-resistant coating, called FF-1, is applied to all interior surfaces of the VS-800 model degreasers. In addition to 21 standard sizes in which this model is available, "specials" will be built to fit individual product requirements.

Adjustable Air Diffusers

Recently announced by the Universal Diffuser Corp., New York 59, is a series of adjustable air diffusers called Flexiflo. This diffuser, with its variable effective area, permits adjustment of the air flow for any setting from zero to full volume or changes in the air throw, without changing the characteristics of the air diffusion pattern.

It consists of a double-flanged conical spiral in which the continuous blades are flexibly held in position and connected to the main cross bar by means of a threaded center rod. By turning the center rod knob, the blades may be shifted to any position from closed to wide open, providing variable adjustment of the effective area with resulting volume and throw changes, while the air diffusion pattern remains constant.

The Flexiflo is the only diffuser on the market that has an equalizing deflector as an integral part of the equipment. The


They wouldn't believe it either
—until they SAW it!
Seeing was believing for a group of mechanical officials from one of the mid-west's most prominent earth moving equipment builders.
Frankly they just wouldn't believe that the new 32" "AMERICAN" Pacemaker Lathe would effectively use 60 horse power and cemented carbide cutting tools in machining rough and tough alloy steel forgings. So they came to see for themselves and they saw:
1 Cuts 1 3/8" deep.
2 Cutting speed 300 feet per minute.
3 .030" feed.
4 60 horse power registered by horse power meter during the maximum cuts.
5 Not a shimmy or whimper from the machine.
They were amazed and convinced.
This new model Pacemaker is endowed with the power, stamina and convenience that combine to produce a thoroughly dependable and highly productive unit.
Bulletin No. 44 tells all . . . have one?
THE AMERICAN TOOL WORKS CO. Cincinnati, Ohio U.S.A.
LATHES AND RADIAL DRILLS

deflector vanes are individually movable and will remain fixed in any position.

These units are available in eleven sizes, the largest being capable of handling up to 9,000 cu. ft. per min. with a throw of over 48 ft.

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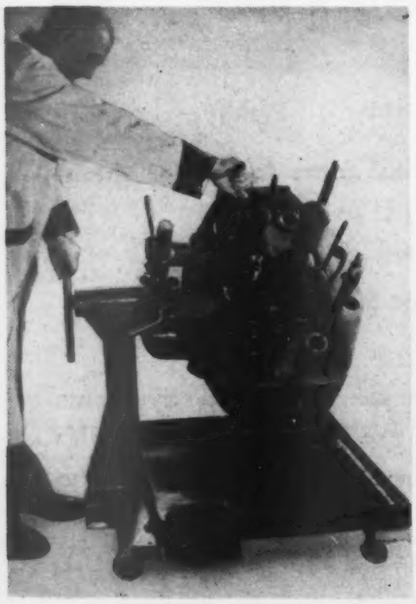

Diesel Engine Stand

It is well known that diesel engine heads are heavy and hard to work on. Without proper equipment, servicing is often awkward and slow.

Engine service shops in the railroad and power plant fields will be able to overcome this problem with the introduction of the All-Kleer Diesel Engine Stand, made by the R & G Manufacturing Co., Muncie, Ind.

This unit is different in that it engages the diesel heads from the side and does not block cleaning or other work on the manifold ends. The head is grasped in a non-jiggling grip by four adjustable engaging pins that fit into the head bolt holes and lock into place. Loosening or tightening of the pressure brake permits rotation of the engine head to practically any angle for most convenient and speedy servicing.

A sub-assembly adapter is available permitting the operator to service small diesel assemblies such as governors, fuel pumps, and similar items. Other features include heavy-duty rollers that permit moving the fully-loaded engine stand, a removable oil drip pan of approximately 10 gal. capacity, and a convenient tool pan.

The device measures only 34 in. high, 30 in. wide and 33 in. long, yet it handles weights and accessories up to 800 lb.

◆

Extra-Thin High Heat Insulation

To meet the demand for an extra-thin high heat insulation, Irvington Varnish & Insulator Company, Irvington, N. J., has introduced a new insulation of this type. This new product is known as Silicone Resin-Coated Novabestos. The insulation is only .003 in. thick, but it can be used at operating temperatures of 180 deg. C., which puts it in the category of Class H insulation. It is composed of 97 per cent pure asbestos and 3 per cent organic material. The long fiber construction of the base asbestos sheet also give it unusual physical properties for such a thin material.

◆

Diesel Engine Starting Fluid

Cold weather can cause serious disadvantages for the drivers of off-rail equipment. Now, according to the California Oil Co., Barber, N.J., that phase of winter automotive operation has been licked with the introduction of Chevron Starting Fluid. Nicknamed vitamin pills for engines, they are products of war necessities. Fixed amounts of the fluid are simply encased in gelatine capsules.

The production of these fluid-containing capsules is under the direction of the Gelatine Products Division, R. P. Shearer Corp., Detroit, Mich. It works with a priming system that is permanently connected to the intake manifold of the engines.

All the operator need do is to place a capsule in the tool, puncture it by pressing down the plunger and then prime the engine before he steps on the starter. The system has been designed with one to three injection nozzles so that it is adaptable to all internal combustion engine types and sizes.

◆

Megger Low Resistance Ohmmeter

The most recent addition to the Megger family of electrical resistance measuring instruments, made by James G. Biddle Co., Philadelphia, Pa., is a low-resistance ohmmeter designed for maximum convenience in field use. The set is self contained with a compartment for storing leads and hand spikes. It is supplied in two models, both having the same ranges of 0 to 1,000, and 0 to 10,000 microhms.

Model 1-R ohmmeter with built-in rectifier

Model 1-B is a battery-powered set which employs two Burgess 4 FH dry cells, or equivalent. Model 1-R has a built-in rectifier which can be plugged in to any ordinary lighting circuit outlet. The complete units, with batteries or rectifiers, weigh about 19 lb.

The ranges of the instrument cover a wide variety of applications, such as routine tests on circuit-breaker contacts, relays, switches, bonds, connections and joints, and bar-to-bar tests on commutator type armatures. The maker states that the ruggedness, compactness, and dependability of the set make it particularly applicable to power system and railroad use. No special training or experience is required for its operation.

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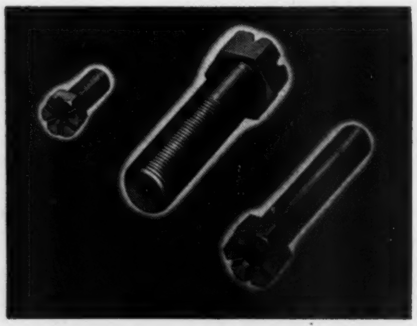

Self-Locking Bolt

A slotted-type "place" bolt, developed by the National Screw & Manufacturing Co., 2440 East 75th street, Cleveland 4, O., requires no nuts, washers or other devices to lock against vibration when drawn up against a rigid seat.

Cold-headed "Place" bolts are fully reusable, are in one-piece, and can be made of carbon as well as alloy steel. They are available in a range of American Standard sizes from ¼ to 1 in., in coarse or fine thread pitches.

The bolt's spring-action head not only establishes the locking action but also insures against fatigue, impact or shock failures. Upset slots across top of head divide it into six equal segments. Upset operation also forms a narrow circular recess under the head and next to the shank. The bearing area is the surface under the head and outside the recess. As the bolt is drawn up, the upward pressure on the bearing area slightly displaces the segments on top of the head, to effect the diaphragm spring action.

Grain flow is continuous through shank and head segments for maximum strength, and the shear section of the head is stronger than the mean equivalent area of the thread. The bolt as a result is capable of carrying a load equivalent to that of a conventional bolt or cap screw.

(*New Devices continued on page 114*)

NEWS

Mechanical Division To Meet in Frisco in 1952

THE next annual meeting of the Mechanical Division, Association of American Railroads, will be held at the Fairmont Hotel, San Francisco, June 24, 25 and 26.

Two-Wheel Hand Brake Inadequate for Diesels

A HAND BRAKE designed to operate upon only two wheels of an eight-wheel diesel-electric locomotive unit "is not an efficient hand brake," the Interstate Commerce Commission has declared. The declaration was embodied in the commission's report on an accident which occurred September 19 on the Seaboard Air Line at Raleigh, N.C. The report was No. 3428 and the investigation out of which it came was conducted by the commission's Bureau of Locomotive Inspection.

The accident was one in which a diesel-electric, running in "uncontrolled movement on a descending grade," collided with the rear end of a work train. It was caused by "inoperative air brakes and a defective hand brake" on the diesel, the commission found.

The hand brake involved was a two-wheel brake. The commission's recommendation was that the Seaboard "install and maintain efficient hand brakes upon its diesel-electric locomotives so located that they can be safely operated while the locomotives are in motion."

The locomotive involved in the collision was diesel unit No. 1714, a B-B type road switcher, which had a total weight of 234,620 lb. and a rated tractive force of 58,655 lb. It was powered by a 1,600-hp. engine and was mounted on two four-wheel trucks, each axle of which was gear connected to a traction motor.

The unit had No. 6-BL air-brake equipment. Its hand brake had a lever-type operating handle, and the hand-brake chain was connected to the right brake lever of the rear truck and "was effective on one pair of wheels only."

The collision occurred while a hostler was undertaking to move the diesel from one servicing track to another at the Seaboard's Raleigh enginehouse. The estimated speed of the locomotive at the time of the collision was 30 to 40 m.p.h. An improperly aligned switch was also involved.

The force of the collision drove the rear of the work train's caboose on top of the front platform of the diesel. The conductor and flagman on the work train were "seriously injured."

The diesel's air-brake equipment was slated for repairs at the time. An engineman, who had just completed a switching trick with it, had reported that the air brakes were "slow in applying and releasing." Evidence gathered by the commission's investigators indicated that, before the hostler undertook to move the unit, a machinist inspector had removed the plugs from the vent holes of the quick release valves of the air-brake apparatus. Thus, the "inoperative air brakes," which was one of the collision's causes.

To its conclusion that a two-wheel arrangement was "not an efficient hand brake," the commission, as indicated above, added a finding to the effect that the hand brake actually involved was also "defective." As to that, the report had this to say:

"The hand brake was tested and it was found that the pawl did not automatically engage the teeth on the ratchet on the upward or power stroke of the handle . . . It was found that the ¾-in. by 3-in. flat steel pawl spring was imbedded in road dirt and grit in the bottom of the operating lever housing. The dirt and grit were removed and all moving parts lubricated,

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of August 1951	Month of August 1950	8 months ended with August 1951	8 months ended with August 1950
3	Road locomotive miles (000) (M-211):				
3–05	Total steam	24,633	31,637	204,899	225,785
3–06	Total, Diesel-electric	23,960	18,842	175,186	134,198
3–07	Total, electric	810	881	6,539	6,527
3–04	Total, locomotive-miles	49,403	51,368	386,647	366,550
4	Car-miles (000,000) (M-211):				
4–03	Loaded, total	1,775	1,848	13,730	12,527
4–06	Empty, total	934	875	6,954	6,633
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6–01	Total in coal-burning steam locomotive trains	44,868	55,426	355,486	371,478
6–02	Total in oil-burning steam locomotive trains	12,267	14,508	96,991	98,825
6–03	Total in Diesel-electric locomotive trains	67,347	54,301	489,287	379,482
6–04	Total in electric locomotive trains	2,225	2,411	17,875	17,240
6–06	Total in all trains	126,716	126,687	959,749	867,208
10	Averages per train-mile (excluding light trains) (M-211):				
10–01	Locomotive-miles (principal and helper)	1.04	1.05	1.04	1.05
10–02	Loaded freight car-miles	40.00	40.30	39.40	38.20
10–03	Empty freight car-miles	21.00	19.10	20.00	20.20
10–04	Total freight car-miles (excluding caboose)	61.00	59.40	59.40	58.40
10–05	Gross ton-miles (excluding locomotive and tender)	2,842	2,765	2,757	2,645
10–06	Net ton-miles	1,351	1,297	1,292	1,999
12	Net ton-miles per loaded car-mile (M-211)	33.80	32.20	32.70	31.40
13	Car-mile ratios (M-211):				
13–03	Per cent loaded of total freight car-miles	65.50	67.90	66.40	65.40
14	Averages per train hour (M-211):				
14–01	Train miles	16.70	16.60	16.90	17.00
14–02	Gross ton-miles (excluding locomotive and tender)	47,101	47,349	46,047	44,264
14	Car-miles per freight car day (M-240):				
14–01	Serviceable	47.40	48.80	45.80	44.20
14–02	All	45.00	45.70	43.70	41.20
15	Average net ton-miles per freight car-day (000) (M-240)	997	998	950	845
17	Per cent of home cars of total freight cars on the line (M-240)	38.10	36.10	37.10	43.30
	PASSENGER SERVICE (DATA FROM I.C.C. M-213)				
3	Road motive-power miles (000):				
3–05	Steam	9,785	12,754	83,766	93,367
3–06	Diesel-electric	17,217	15,698	128,880	115,184
3–07	Electric	1,657	1,650	12,993	12,807
3–04	Total	28,659	30,102	225,639	221,358
4	Passenger-train car-miles (000):				
4–08	Total in all locomotive-propelled trains	283,996	295,207	2,192,681	2,129,042
4–09	Total in coal-burning steam locomotive trains	51,998	66,545	438,908	478,212
4–10	Total in oil-burning steam locomotive trains	33,181	44,208	267,812	293,967
4–11	Total in Diesel-electric locomotive trains	181,027	166,745	1,347,777	1,219,207
12	Total car-miles per train-miles	17,789	17,709	138,184	137,655
	YARD SERVICE (DATA FROM I.C.C. M-215)				
1	Freight yard switching locomotive-hours (000):				
1–01	Steam. coal-burning	1,148	1,533	9,896	11,232
1–02	Steam, oil-burning	238	284	1,915	1,907
1–03	Diesel-electric[1]	3,070	2,701	23,343	19,358
1–06	Total	4,482	4,549	35,360	32,710
2	Passenger yard switching hours (000):				
2–01	Steam, coal-burning	41	57	385	478
2–02	Steam, oil-burning	13	15	104	105
2–03	Diesel-electric[1]	249	237	1,932	1,803
2–06	Total	337	344	2,688	2,657
3	Hours per yard locomotive-day:				
3–01	Steam	7.6	8.9	7.8	7.8
3–02	Diesel-electric	17.2	17.9	17.3	17.3
3–05	Serviceable	14.5	14.9	14.4	1.30
3–06	All locomotives (serviceable, unserviceable and stored)	12.4	12.8	12,4	11.7
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.75	1.71	1.78	1.80
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.74	0.72	0.76	0.77

[1] Excludes B and trailing A units.

In a hurry  **for smooth-riding freight cars?**

Get them now!

INSTALL ASF RIDE-CONTROL® PACKAGES

You can enjoy the advantages and savings of longer spring travel *now*, by installing the A.S.F. Ride-Control Package in your present rolling stock.

The Ride-Control Package is a complete spring group with built-in 3-way friction control (the famous A.S.F. Ride-Control principle). The unit comes completely assembled, is installed as a unit in place of the present spring group.

This Package gives 2½ to 3 inches of controlled spring travel, in place of the AAR-standard 1-9/16 to 1⅝ inches. Separate Ride-Control springs provide constant pressure on hardened friction surfaces to control movement in all three directions.

Cost is low—about $160 per car set—but it means big savings. Ride-Control helps protect lading and cut claims. It helps protect rolling stock and cut repair costs. It helps protect roadbed and cut track maintenance. You can't lose! And you can have it now!

Talk it over with your A.S.F. representative and ask him for all the details; or write American Steel Foundries, 400 North Michigan Ave., Chicago 11, Illinois.

AMERICAN STEEL FOUNDRIES

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after which the handle and working parts were replaced. The brake could then be operated."

The report's summary of evidence said that the engineman, who operated the diesel on the switching trick just prior to the accident, had stated "that he used the hand brake during the dinner period and that he had to hold the dog with one hand while operating the handle with the other." Daily inspection reports on the locomotive were also in evidence. They included one made by an engineman on September 9 at Hermitage, Va.—"Hand brake broken."

24,200 Cars in N.P.A. First Quarter Program

FREIGHT cars programmed for production in the first quarter of 1952 total 24,200, the National Production Authority has announced. However, the announcement said, because of acute shortages of materials, allotments of controlled materials will be made to carbuilders on a basis of 21,200 cars.

Allocations will be made according to the following table:

	Total authorized	Total for which material will be granted
Tank cars	2,500	2,000
Domestic freight cars	20,500	18,000
Export cars (For Mexico)	1,200	1,200
Total	24,200	21,200

The new program determination authorized by the Defense Production Administration does not provide for any increase in allotments of steel, copper and aluminum to freight-car builders. These allocations, N.P.A. said, will still be based upon the original program determination.

"Although material allocations are not sufficient to build the larger number of units now authorized, it is believed that carbuilders will be able to build the larger number of units authorized now by using some materials from inventories and by conservation and substitution," Guy O. Beale, director of N.P.A.'s railroad equipment division, said. "The government fully recognizes the importance of a sound and healthy railroad transport system in the U. S. Program determinations on freight-car buildings are being made with this consideration in mind and are supported with controlled material allotments to the fullest extent possible in the present period of shortages."

Time for Compliance With New Diesel Brake Rule Set Back

THE Interstate Commerce Commission has set back, from January 1, 1952, until March 1, 1952, the date by which railroads must have fitted diesel-electric locomotives built prior to January 1, 1951, with equipment required by the modified air-brake rule of the commission's Rules and Instructions for Inspection and Testing of Locomotives Other Than Steam. The rule involved is Rule 205(a), and the modification was prescribed by a commis-

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE DECEMBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horse-power	Service	Builder
Chesapeake & Ohio	81[1]	1,500	Freight	Electro-Motive
	21[1]	1,500	Freight and passenger	Electro-Motive
	10[1]	1,200	Switchers	Electro-Motive
	26[1]	1,600	Road switch	Alco-G. E.
	11[1]	1,600	Road switch	Baldwin-Westinghouse
Pennsylvania	8A[2]	1,500	Road freight	Electro-Motive
	4B[2]	1,500	Road freight	Electro-Motive
	13[2]	1,500	Road switch	Electro-Motive
	32[2]	1,200	Yard switch	Electro-Motive
	22A	2,250	Passenger	Electro-Motive
	13[2]	1,000	Yard switch	Alco-G. E.
	2[2]	1,000	Road switch	Alco-G. E.
	33[2]	1,600	Road switch	Alco-G. E.
	6[2]	1,600	Six-motor road switch	Alco-G. E.
	44[2]	1,200	Road switch	Baldwin-Westinghouse
	1[2]	1,200	Road switch	Baldwin-Westinghouse
	8[2]	2,400	Transfer	Baldwin-Westinghouse
	13[2]	1,200	Yard switch	Fairbanks, Morse
Reading	20	1,600	Road switch	Alco-G. E.
	10	1,600	Road switch	Baldwin-Westinghouse
	8	1,500	Road switch	Electro-Motive
	2A	1,500	Passenger	Electro-Motive

DIESEL-ELECTRIC LOCOMOTIVE INQUIRIES

Transportation Corps	772	1,600	
	20	1,200	

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Atchison, Topeka & Santa Fe	30[3]	Refrigerator	Company shops
Gulf, Mobile & Ohio	200[4]	Pulpwood	Company shops
Minneapolis, St. Paul & Sault Ste Marie	50	70-ton ballast	American Car & Fdry.
Missouri-Kansas-Texas	25[5]	50-ton flat	Company shops
Pennsylvania	3,600[2]	Gondola	Company shops
	1,000[2]	Box	Company shops
	200[2]	Covered hopper	Company shops
	200[2]	Flat	Company shops
Wabash	200	50-ton box	American Car & Fdry.

FREIGHT-CAR INQUIRIES

Transportation Corps	1,646	40-ton gondola
	1,386	10,000-gal. tank
	135	Refrigerator
	2,000	40-ton box

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Chicago & Eastern Illinois; Louisville & Nashville; Nashville, Chattanooga & St. Louis	29[6]	Sleeping	Pullman-Standard

PASSENGER-CAR INQUIRIES

Transportation Corps	89	Kitchen-troop hospital

[1] For delivery during the first half of 1952.

[2] Deliveries of the locomotives scheduled to begin next April. The cars are scheduled to be put into service beginning in April at a monthly rate of 200 to 400 cars, depending on steel allocations. Approximately $800,000 has also been appropriated for heavy repairs to existing freight cars.

[3] To be equipped with diesel-powered refrigeration systems provided by the Trance Company, the Frigidaire Division of General Motors, and the Carrier Corporation.

[4] To cost approximately $1,125,000.

[5] Construction tentatively scheduled for early 1952, at a cost of approximately $200,000.

[6] This order calls for 29 identical combination bedroom, roomette and open section cars costing $163,000 each—or a total of $4,727,000. Delivery is contemplated for the first quarter of 1953. The cars, to be of lightweight construction ,will contain four bedrooms, six roomettes and four open sections. Both the bedrooms and roomettes will have circulating ice water and individual air-conditioning controls. The bedrooms will be arranged for occupation *en suite* if desired. The cars will be used flexibly between the roads' joint services as conditions warrant.

NOTE:

Chicago, Rock Island & Pacific.—The board of directors of the Rock Island has authorized the purchase of 27 800-hp. switching and 25 1,500-hp. road-switching diesel-electric locomotive units.

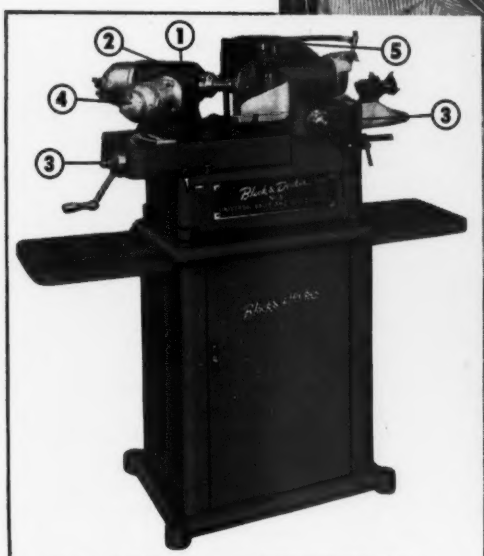
SUMMARY OF MONTHLY HOT BOX REPORTS

Month	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes: System	Foreign	Total	Miles per hot box car set off between division terminals
July, 1950	2,745,932,894	....	.....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038

GRIND VALVES

this fast, accurate, cost-cutting way!

IN THE GREAT NORTHERN'S St. Paul shops, this B&D No. 6 Universal Valve and Tool Grinder refaces diesel valves up to 5¼″ head diameter. Work-head chucks stems from ¼″ to 1¼″ and rotates for 0° to 90° grinding.



This B&D No. 6 GRINDER Gives You 5 EXCLUSIVE Features!

① **Hypoid Gear Drive** on work-head spindle assures smooth operation, mirror-finish.

② **Air - Operated Work - Head Chuck** speeds operation of valve stem collets, accurately centers valves.

③ **Precision - Ground Feed Screws** are bearing-mounted for fast, smooth travel of work head and wheel head. Wheel-head feed screw is calibrated in thousandths for close tolerance grinding.

④ **Separate Universal Motor,** with automatic cutoff controlled by table travel, drives work head at controlled speeds for best grinding of either large or small valve heads.

⑤ **Separate ¾ HP Constant-Speed Motor** gives abundant power, proper speed for 6″ grinding wheels or cup wheels.

LIKE the Great Northern, more and more railroads operating diesel equipment are turning to the Black & Decker No. 6 Valve and Tool Grinder for faster, more accurate valve grinding — producing better finishes, free from chatter marks — eliminating costly regrinding or scrapping of valves. See for yourself how it will save you time and money — ask your nearby Black & Decker Distributor for a demonstration. Or write for free, detailed booklet to: THE BLACK & DECKER MFG. CO., 665 Pennsylvania Ave., Towson 4, Maryland.

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PORTABLE ELECTRIC **TOOLS**

sion order of January 29, 1951, in a proceeding docketed as Ex Parte 174. (See page 90, March, 1951, *Railway Mechanical and Electrical Engineer.*)

Bryant Chairman A.S.M.E. Railroad Division for 1952

C. B. Bryant, chief engineer, Technical Board, Wrought Steel Wheel Industry, is chairman of the Railroad Division, American Society of Mechanical Engineers, to serve until the close of the annual meeting of the society in 1952. Mr. Bryant succeeds C. E. Pond, assistant to superintendent motive power, Norfolk & Western, who served as chairman during 1951. Other members of the Executive Committee for the coming year are D. W. Bohannon, manager purchases and stores, Pullman Company; E. M. VanWinkle, vice-president, American Steel Foundries; C. K. Steins, mechanical engineer, Pennsylvania, and J. S. Newton, vice-president, Baldwin-Lima-Hamilton Corporation. E. L. Woodward, western mechanical editor, Railway Age, is secretary.

New members on the General Committee of the Railroad Division with five-year terms expiring in 1956, include M. M. Cooledge, eastern sales representative, Buckeye Steel Castings Company; J. W. Hawthorne, general superintendent motive power and car equipment, Atlantic Coast Line, and J. F. Weiffenbach, vice-president in charge of manufacturing, Canadian Locomotive Company, Ltd. E. H. Davidson, director, Bureau of Locomotive Inspection, Interstate Commerce Commission, whose term on the General Committee expired this year, continues on the committee for a second term.

The terms of the new officers and committee members began at the close of the final Railroad session at the annual meeting of the Society held at Atlantic City, November 26-29.

A. A. R., Mechanical Division

Interchange Rules on Flood Damage Clarified

In a circular letter dated November 19, the A. A. R. Mechanical Division reports that damage to a large number of freight cars partially or totally submerged during floods in the midwest last summer caused many questions regarding responsibility, settlements, etc., which have been studied by the Arbitration Committee and the following interpretations approved:

"Sec. (10) (1) of Rule 32 and Par. (12) Sec. (a) of Passenger Car Rule 8 include damage to any part of the car; C. O. T. & S. or air brakes together with the work to be performed as outlined in Sec. V Supplement 1 of Instruction leaflet No. 2391 when brakes have been submerged; repacking of journal boxes and all other work performed as specified in the Lubrication Manual; rusted or pitted journals; cleaning inside and outside of car and parts thereof of silt, mud, grease, tars, acids, etc.; painting where necessary; renewal of sheathing, lining, flooring or ceiling, due to warped, split or contaminated condition; and including insulation which has been contaminated or otherwise damaged.

"If a car with flood damage concealed in ordinary inspection and without flood damage defect card attached is found to have been partly or totally submerged in flood, the 90-day limit for procuring joint inspection under Sec. (k) and Interpretation 3 of Rule 4 is considered as beginning upon first receipt of car home after responsibility is acknowledged by damaging line that car was in flood."

Cast Steel To Be Tested in Freight Service

The General Committee of the division, in a meeting at Chicago on November 16, approved the recommendations of the Committee on Wheels that authority be granted to manufacture and place in service under interchange freight cars up to 1,000 experimental cast steel wheels with carbon content of 1.50 per cent and up to 1,000 wheels with carbon content of 0.75 per cent.

SUPPLY TRADE NOTES

Baldwin-Lima-Hamilton Corporation.—the Baldwin-Lima-Hamilton Corporation has transferred its Washington district office from 616 Tower building to 642 Wyatt building, 14th and New York avenue, N.W., Washington 5.

John S. Newton, vice-president of the corporation at Eddystone, Pa., has been assigned complete responsibility for the Locomotive division, including locomotives, renewal parts and other related equipment.

◆

Journal Box Servicing Corporation.—*Thomas I. Conway* has been appointed supervisor of service of the Journal Box Servicing Corporation of Indianapolis, with headquarters in Chattanooga, Tenn.

Mr. Conway has spent a number of years in various experimental and research capacities for the company, and has been plant foreman at a number of plants throughout the country. In 1935 he was appointed western supervisor, at Pocatello, Idaho. In 1939, he was appointed service engineer on the Southern, with headquarters at Chatanooga.

◆

Cummins Engine Company.—*R. F. Davis*, formerly assistant regional manager, Central region, of the Cummins Engine Company, at Chicago, has been promoted to regional manager, Eastern region, with headquarters at New York. Mr. Davis succeeds *Walter N. Westland*, who has been appointed head of Cummins Diesel of New England, Inc., with headquarters at Allston, Mass. *W. G. Turner*, regional manager of the southeastern region at Atlanta, Ga., has been transferred to Cleveland as regional manager, Great Lakes region.

◆

Pittsburgh Plate Glass Company.—The Pittsburgh Plate Glass Company will enter the fiber glass production field in the near future and formation of a separate development and production unit—the Fiber Glass Division—is now in process. *J. Hervey Sherts* will head the new division as general manager.

◆

Timken Roller Bearing Company.—*Robert E. Cook*, formerly field engineer with the Timken Roller Bearing Company at Cleveland, has been appointed sales engineer of the steel and tube division of the Cleveland office.

◆

Minneapolis - Honeywell Regulator Company. — Minneapolis-Honeywell has opened a new district office at Harrisburg, Pa., in the Kline Village development. *William J. Brosch* and *Jack Caylor* will handle sales for the companys Brown Instruments division; *John Hopkins* will handle commercial, and *Donald Schmick*, heating controls divisions sales.

Standard Car Truck Company.—*Ben H. Leese* has been appointed service manager of the Standard Car Truck Company. He will supervise an augmented service staff to care for and instruct railroad personnel in the field servicing of Barber stabilized trucks.

Mr. Leese, formerly on the engineering staff of the Locomotive Firebox Company, became associated with the Standard Car Truck Company in 1949, as draftsman and inspector. He was born on May 14, 1903, in Davenport, Iowa.

◆

Superheater Company.—*H. G. Harrison*, formerly assistant to the manager of service of the *Superheater Company*, division of *Combustion Engineering-Superheater, Inc.*, has been appointed manager of service, with headquarters at East Chicago, Ind., and *F. C. Widmayer*, formerly service representative, has been appointed assistant manager of service, also of East Chicago.

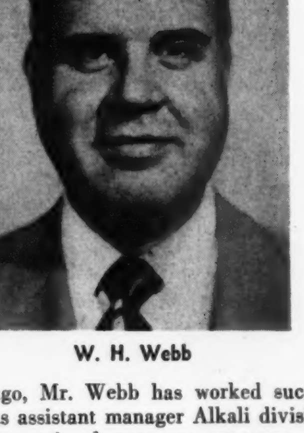
◆

Fafnir Bearing Company.—*Henry Hubbell* of the Fafnir Bearing Company, New Britain, Conn., was one of the prize winners in a casting design contest conducted by the *Meehanite Metal Corporation*, New Rochelle, N. Y., opened to design engineers in manufacturing plants using castings, aimed toward uncovering facts toward new uses and applications of Meehanite cast-

ings and uncovering problems solved by their specifications. For his paper on "Railway Journal Housing," Mr. Hubbell won the fourth of six prizes offered by the Meehanite company.

◆

DETREX CORPORATION.—*W. H. Webb* has been appointed sales manager of alkali products for the Detrex Corporation of Detroit. Since he jointed Detrex 10



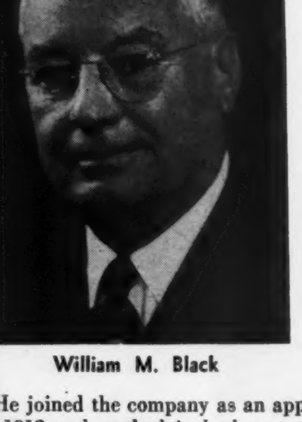
W. H. Webb

years ago, Mr. Webb has worked successively as assistant manager Alkali division, assistant national accounts manager and central region manager.

◆

AMERICAN BRAKE SHOE COMPANY.—*William M. Black* has been appointed president, and *Joseph L. Mullin* vice-president, of the Electro-Alloys division, American Brake Shoe Company. *Walter G. Hoffman*, former president of the division, has been appointed assistant to the vice-president for research and development of American Brake Shoe.

Mr. Black is a vice-president of American Brake Shoe and also president of the American Manganese Steel division since

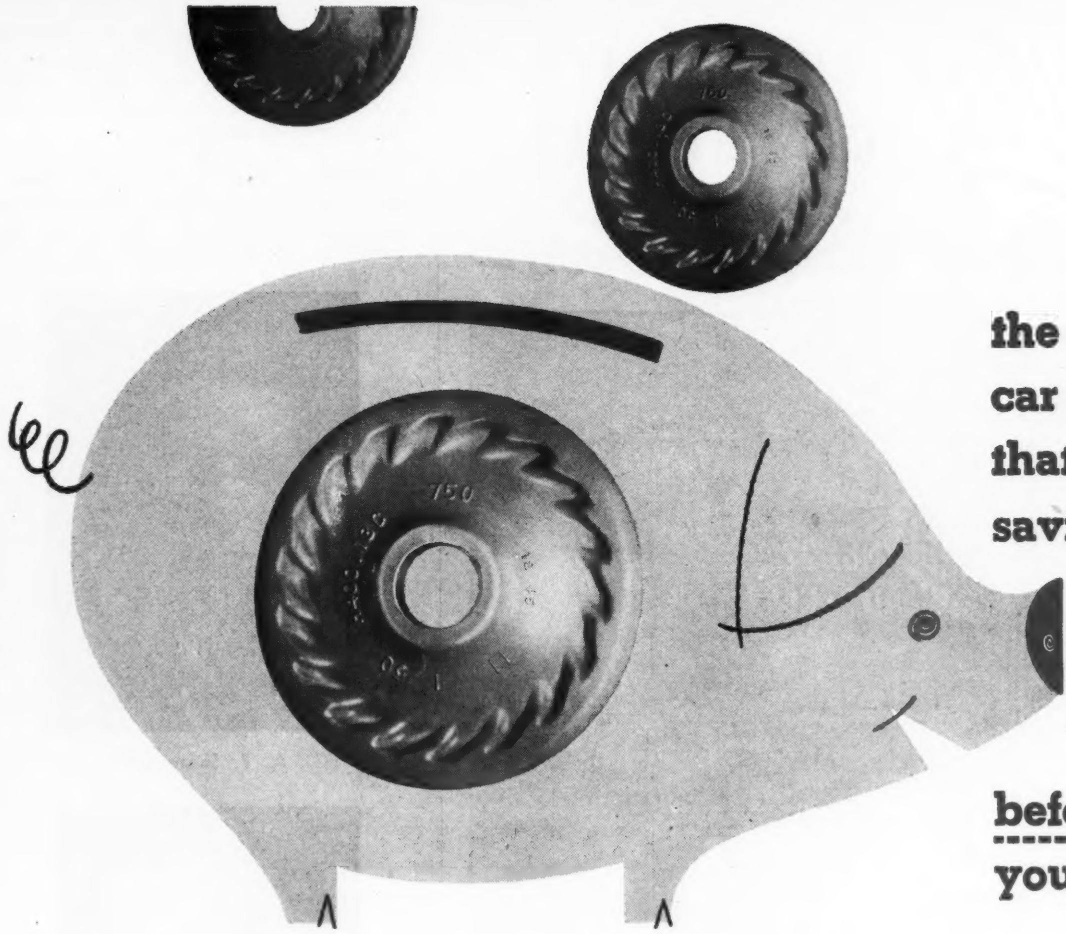


William M. Black

1940. He joined the company as an apprentice in 1912 and worked in both operating and sales departments.

Mr. Mullin, who joined the company in 1914, is vice-president in charge of operations for the American Manganese Steel division and will continue in that capacity.

Mr. Hoffman will be assigned to special metallurgical development projects at the



the car wheel that starts saving money

before you buy it!

The railroad that runs its freight cars on AMCCW wheels literally saves money on every wheel it buys—before it buys it! Reason is that reliable, prompt, short-haul delivery schedules permit a *minimum* inventory. You don't have to order this wheel months ahead, or tie up capital to maintain a big stockpile. You *know* you can get the wheels you want from the AMCCW plant on or near your line . . . in a matter of weeks, if not days.

A smaller car wheel inventory is just as good as money in the bank. *Better* if you can put it to more profitable use.

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Once the wheel is delivered, you save again, in the Wheel Shop. Boring is faster, easier on cutting tools. The gray iron hub greatly reduces the pressures required for mounting. And when they are mounted, AMCCW wheels stay put.

Quick, low-cost delivery of chilled car wheels from the AMCCW plant near you.

With the new heavier-tread, thicker-bracketed chilled wheels under your cars, you save again, in terms of increased ton-miles of service.

Even after an AMCCW wheel has lived its long life, the savings continue. Short hauls to the nearest AMCCW foundry, low exchange costs for new wheels, combine to keep replacement wheel costs to the very minimum.

In good supply
Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

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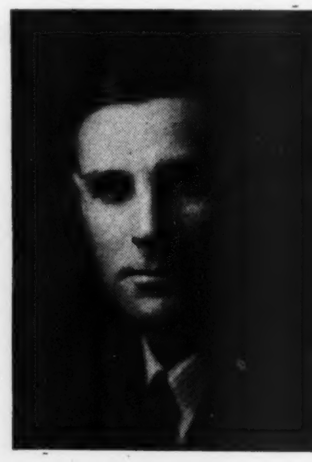
American Car & Foundry Co. • Southern Wheel (American Brake Shoe Co.)
Griffin Wheel Co. • Marshall Car Wheel & Foundry Co.
New York Car Wheel Co. • Pullman-Standard Car Mfg. Co.

company's research center in Mahwah, N. J. He joined the sales department of American Manganese steel division in 1930 and was appointed president of the Electro-Alloys division in 1943.

◆

NATIONAL STEEL CAR CORPORATION.—*A. P. Shearwood* has been appointed vice-president in charge of sales of the National Steel Car Corporation and *H. J.*



A. P. Shearwood

H. J. Lang

Lang, acting assistant to the president, has been appointed a vice-president. Messrs. Shearwood and Lang, both graduates in engineering of McGill University, joined National Steel Car in 1932 and 1945, respectively.

◆

GENERAL ELECTRIC COMPANY.—*Glenn B. Warren*, general manager, Turbine Divisions, General Electric Company, Schenectady, N. Y., during the recent A.S.M.E. annual meeting at Atlantic City, was awarded the A.S.M.E. medal for "leadership in the science and art of turbine design." J. Kenneth Salisbury, division engineer, general engineering and consulting laboratory, received the Richards Memorial Award for "outstanding achievement in mechanical engineering within 20 to 25 years after graduation."

◆

EUTECTIC WELDING ALLOYS CORPORATION.—A wing to house two new research laboratories has been completed by Eutectic Welding Alloys Corporation, Flushing, N. Y. The new building, it is said, will

contain a special staff of research chemists and physicists who will concentrate on the development of new welding alloys utilizing fewer critical short metals. Research on new metals, such as titanium joining, is also included among the projects scheduled for this group.

◆

CANADIAN LOCOMOTIVE COMPANY.—*J. F. Weiffenbach*, works manager of the Canadian Locomotive Company of Kingston, Ont., has been appointed vice-president in charge of manufacturing of the Company, to succeed *J. J. Jarrell*, who has retired after 45 years with the firm. In his new position, Mr. Weiffenbach will direct manufacture of diesel-electric locomotives and engines, as well as a wide range of industrial equipment.

Mr. Weiffenbach is a graduate of the University of Michigan (1934) with a degree in mechanical engineering. He later joined the Electro-Motive Division of General Motors Corporation at La Grange, Ill., where he worked for 12 years. In 1946 he joined Fairbanks, Morse & Co. in Chicago, and subsequently was appointed chief engineer of its diesel locomotive division, and later manager of engineering at its Beloit, Wis., plant. In April 1951 Mr. Weiffenbach was appointed works manager of Canadian Locomotive at the Kingston, Ont., plant, the position he held at the time of his recent promotion.

J. F. Weiffenbach

◆

QUAKER RUBBER CORPORATION.—*J. J. Merkel* and *E. E. Klemm* have been appointed branch managers of the Detroit and Cleveland districts, respectively, of the *Quaker Rubber Corporation*, division of the *H. K. Porter Company*.

◆

UNITED STATES RUBBER COMPANY.—*H. Barden Allison* has been appointed district sales manager of the Philadelphia branch, mechanical goods division, *United States Rubber Company*, to succeed *A. B. Means*, who will continue as sales advisor.

◆

GEORGIA-PACIFIC PLYWOOD COMPANY.—The Georgia-Pacific Plywood Company has opened a new warehouse at Harborside Industrial Park, Providence, R. I. *Bernard V. Longerman* will be in charge, under supervision of district manager *Charles Levesque*. The company also has completed an extensive warehouse improve-

ment and expansion program at Port Newark, N. J., including a new office building on Marsh street, to house eastern division offices and Port Newark warehouse offices.

◆

AMERICAN AIR FILTER COMPANY OF CANADA.—The Canadian business of the American Air Filter Company, Louisville, Ky., will be handled by *American Air Filter of Canada*, Montreal. *William G. Hole*, formerly of Darling Bros., Ltd., will be in charge of all Canadian operations.

◆

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—*William E. Russell, Jr.*, of the New York law firm of Russell & Russell, has been elected a member of the board of directors of the Simmons-Boardman Publishing Corporation, publishers of the

William E. Russell, Jr.

Railway Mechanical and Electrical Engineer and other publications in the transportation and building industries. Mr. Russell takes the place on the directorate formerly occupied by the late Mrs. Ida R. Simmons, who was principal stockholder in the publishing company. His father, senior member of the Russell & Russell

John S. Vreeland

firm, has been on the directorate of the publishing company for many years and is trustee under the will of the late Mrs. Simmons of the controlling stock interest in the publishing company. The Russell firm has for many years handled the legal

(*Continued on page 106*)

(*Continued from page 102*)

affairs of the publishing company. *John S. Vreeland* has been elected a vice-president of the corporation. Mr. Vreeland, a sales representative for the Simmons-Boardman railroad publications since June 1946, was formerly eastern engineering editor of *Railway Age* and eastern editor of *Railway Engineering and Maintenance.*

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PRECO, INC.—Preco, Inc., Los Angeles, Calif., has announced that *Electra Motors,* Anaheim, Cal., has been selected to develop and supply small electric motors and accessory equipment for use with Preco fans in refrigerator car installations.

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ALUMINUM COMPANY OF AMERICA. — Thomas D. Jolly, vice-president in charge of engineering and purchases for the Aluminum Company, has received the Merit Award of the Carnegie Institute of Technology "in recognition of his achievement in engineering and management in the aluminum industry, which has brought great credit to him and to his Alma Mater."

Obituary

JOSEPH A. BROWNELL, formerly assistant manager of railway sales for the Texas Company in New York, died on November 24. He was 66 years old.

L. L. KING, Denver sales representative of the Okonite Company, died on November 2. He had been with Okonite since 1930.

ALBERT C. SENSENNEY, division manager of the railway sales department of the Lehon Company, died on November 21 in Chicago. He was 62 years old.

WILLIAM T. BISSELL, vice-president and general manager of the Journal Box Servicing Corporation at Indianapolis, died on October 8. Mr. Bissell started his railroad career in 1902 as oil-house man for the St. Louis-San Francisco at Springfield, Mo., and advanced until he became traveling storekeeper. In 1913 he went to the Chicago & Eastern Illionis at Danville, Ill., as general storekeeper. He started with the Journal Box Servicing Corporation in 1928 as service engineer, and several years later became general manager and still later vice-president and general manager.

PERSONAL MENTION

General

A. H. E. PARKES, assistant superintendent and master mechanic of the Canadian National at Prince George, B. C., has been appointed superintendent of motive power and car equipment for the Saskatchewan district at Saskatoon, Sask. Mr. Parkes in 1916 became a call boy in the employ of the company at Winnipeg. He held various positions in the Manitoba district until 1929, when he became locomotive foreman

at Swan River, Man. In 1939 he was named shop foreman at Fort Rouge, Man., and in 1941 was transferred to Calgary, Alta., as acting master mechanic. He was appointed master mechanic there in 1942, and master mechanic at Edmonton, Alta., in 1943. In 1948 he was appointed assistant superintendent and master mechanic at Prince George.

W. C. Bowra, general superintendent motive power and car equipment of the Grand Trunk Western at Battle Creek, Mich., has been appointed general superintendent motive power and car equipment of the Central Region of the Canadian National at Toronto.

Gordon T. Wilson, assistant engineer car equipment of the New York Central System at New York, has been appointed engineer car equipment. Mr. Wilson was born at Middletown, N. Y., on December 25, 1896. He received an electrical engineering degree from Syracuse University in 1921 and was a helper apprentice on the New York, Ontario & Western during summer vacations from 1912 until 1920, except while he was in the U. S. Navy from June 1917 until February 1919. Mr. Wilson was in the engineering department of the Niagara Hudson Power Company, Buffalo, from June 15, 1921, until February 1, 1923. On that date he became special engineer

G. T. Wilson

motive power, on the New York Central at Buffalo. On January 2, 1925, he was appointed shop and equipment inspector, test department, for the N. Y. C. System at Buffalo. On January 15, 1926, he became general inspector, test department, at New York; on May 15, 1927, general equipment inspector motive power (assistant to chief engineer), at New York; on March 15, 1936, general equipment inspector (locomotives); on March 15, 1937, automotive engineer, and on November 1, 1945, assistant engineer car equipment, System, at New York. Mr. Wilson is a member of the Air Conditioning Committee of the A.A.R. Mechanical Division. He is a licensed professional engineer in New York State.

Orris L. Dean, chief engineer of the Bangor & Aroostock at Houlton, Me., has retired on account of ill health, after 38 years of service. Mr. Dean was born at Medford, Me., on December 2, 1890, and served as sectionman on the B.&A. at

Derby, Me., during the summer of 1909 and from June 1910 until February 1911. Since September 1914 he has been in the continuous service of that road succeeding, as machinist helper, machinist, erecting foreman, acting general foreman, general inspector motive power, shop superintendent, acting mechanical superintendent, mechanical superintendent, superintendent shops and mechanical superintendent.

CHARLES H. LOCKHART, mechanical inspector of the Canadian National at Montreal,, has been appointed superintendent of motive power and car equipment of the Central Vermont at St. Albans, Vt. Mr. Lockhart began his railroad career as a machinist apprentice 41 years ago and subsequently served as machinist, draftsman and mechanical inspector. During the war his services were loaned to the Canadian government in the auto and tank production branch of the Department of Munitions and Supply. Mr. Lockhart has looked after all details in connection with building new locomotives at the Montreal Locomotive Works and the Canadian Locomotive Company at Kingston, Ont.

NEW YORK CENTRAL.—The Equipment Department, Line East, of the New York Central has been reorganized as follows:

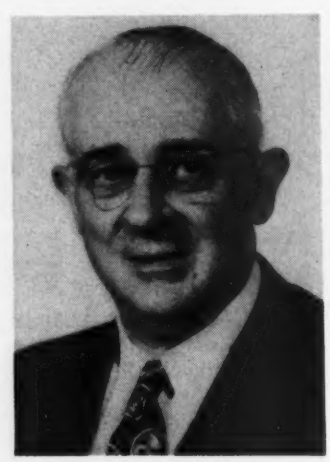
F. E. Edwards, master mechanic at Harmon, N. Y., now has jurisdiction over the locomotive department on Hudson, Harlem and Putnam divisions. Mr. Edwards, as formerly, has jurisdiction also over locomotive and multiple unit equipment on Electric division.

R. J. Parsons, master mechanic at Albany, N. Y., now has jurisdiction over both locomotive and car departments on the Mohawk, River and Adirondack divisions.

E. L. Hyatt, master mechanic of the Boston & Albany at Boston, Mass., now has jurisdiction over locomotive and car department facilities at Hudson, N. Y., previously under the jurisdiction of Mr. Parsons.

G. A. Miller, division general car foreman at Mott Haven, N. Y., now has jurisdiction over car department, Electric, Hudson, Harlem and Putnam divisions.

EDWIN P. MOSES, engineer car equipment, New York Central System, has retired. Mr. Moses was born on May 13, 1884, at Croton Falls, N. Y. He attended high school for three years and in 1902 became a draftsman for the Neptune Meter Company, Long Island City, N. Y. Later in the same year he became a draftwsman for the Pan-American Motor Company, Mamaroneck, N. Y., and Marion, N. J. In March 1903 he entered the employ of the Western Electric Company as a draftsman and checker. His association with the New York Central began in 1905 as a draftsman at New York. In 1909 he was appointed draftsman foreman; in 1911, chief car draftsman; and in 1918, general car inspector. From March until



E. P. Moses

September, 1921, he was foreman construction inspector, and then general inspector until 1923. He was appointed chief equipment inspector in 1923; assistant engineer rolling stock in 1924; general equipment inspector in 1925; engineer rolling stock, N.Y.C. System, in 1926, and engineer car equipment on January 1, 1949. Mr. Moses was a member of the Car Construction Committee of the A.A.R. Mechanical Division from 1941 until 1946. At the time of his retirement he was chairman of the Mechanical Division Committee on Geared Hand Brakes, of which he became a member in 1942, and chairman of the Joint Committee on Railway Sanitation which began its research project on January 1, 1946. He is a member of the

American Society of Mechanical Engineers and of the New York Railroad Club.

ARTHUR SELBEE, superintendent of motive power and car equipment of the Central Vermont at St. Albans, Vt., has been appointed general superintendent, motive power and car equipment of the Grand Trunk Western at Battle Creek, Mich.

IRVING C. BLODGETT, supervisor of schedules of the Boston & Maine, has retired after more than 50 years of service. He was assistant to the mechanical superintendent from 1926 to April 1927.

W. C. SEALY, general superintendent motive power and car equipment of the Central Region of the Canadian National at Toronto, has retired.

A. O. SCOTT, master mechanic of the Canadian National at Port Arthur, Ont., has been appointed regional locomotive fuel supervisor at the same Port Arthur.

W. J. STROUT, chief engineer of the Bangor & Aroostock at Houlton, Me., has been appointed acting mechanical superintendent.

C. H. GRAY has been appointed superintendent motive power for the Chicago, Rock Island & Pacific at El Reno, Okla.

Shop and Enginehouse

HENRY A. M. WHYTE, wheel shop foreman of the Great Northern at St. Paul, Minn., has been appointed superintendent of shops at Superior, Wis.

J. H. MARKS has been appointed general foreman of the Chesapeake & Ohio, Hinton Division, at Hinton, W. Va. Mr. Marks was previously assistant roundhouse foreman at Hinton.

Master Mechanics and Road Foremen

M. T. LLEWELLYN, master mechanic of the Hinton division, Chesapeake & Ohio, at Hinton, W. Va., retired on November 1.

V. V. VIAR, general foreman of the Chesapeake & Ohio at Hinton, W. Va., has been appointed master mechanic of the Hinton division at Hinton.

W. C. REDDICK, traveling mechanical inspector for the St. Louis-San Francisco, has been appointed to the newly created position of assistant master mechanic.

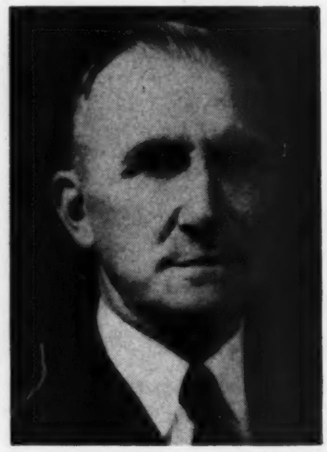
J. A. E. FISET, road foreman of engines of the Canadian National at Winnepeg, has been named master mechanic of the Portage-Brandon division, remaining at Winnepeg.

Car Department

CLARENCE C. LARSON, general car foreman of the Illinois Central, has been appointed assistant superintendent of car department at Gary, Ind.

W. A. EMERSON, superintendent car department of the Elgin, Joliet & Eastern at Joliet, Ill., has retired after 50 years of service.

EDGAR S. SMITH, master car builder of the Florida East Coast, at St. Augustine, Fla., retired on November 1. Mr. Smith was born on November 29, 1867, at Renova, Pa. He became a patternmaker apprentice in the employ of the Chesapeake & Ohio on January 1, 1885. He was subsequently a mechanic on various railroads until 1893 when he became a foreman on the Southern. On January 27, 1903, he became a car foreman on the Louisville & Nashville, and on July 1, 1904, was appointed general foreman car department of the system. He was superintendent of the Damascus Brake Beam Company plants



E. S. Smith

at Sharon, Pa., and Cleveland, Ohio, from July 27, 1907 to November 1, 1912. On January 1, 1913, he became superintendent of the Henderson Iron Works, Shreveport, La. He was car foreman of the Tennessee Central from July 1, 1914 until September 1917, when he was appointed master car builder of the Florida East Coast at St. Augustine. Mr. Smith was a vice-president of the Car Department Officers' Association from 1939 to 1941. During 1935-36 he served on the A.A.R. committee appointed, under the direction of L. W. Wallace, director of equipment research, to study various systems of passenger-car air-conditioning then in use.

VICTOR SMALL, assistant superintendent of car department of the Illinois Central at Gary, Ind., has been appointed superintendent of the car department.

V. G. SMALL, assistant superintendent car department of the Elgin, Joliet & Eastern, at Joliet, Ill., has been appointed superintendent car department, with headquarters at the same point.

HENRY G. HIELSCHER, chief car inspector of the Illinois Central, has been appointed general car foreman at Gary, Ind.

Electrical

HAROLD T. THEIS, who has been appointed chief electrical engineer of the Central of New Jersey as announced in the December issue, was born at Scranton, Pa., on March 26, 1909. He is a graduate of Pennsylvania State College where he received a B.S. degree in electrical engineering. From October 1934 to May 1942, he was, successively, field engi-

neer for Jensen, Bowen & Farrell; engineer for Day & Zimmerman, Inc.; electrical engineer for the Cramp Shipbuilding Company, and electrical designer for United Engineers & Construction, Inc. From May 1942 to April 1946, he served as electrical and mechanical engineer, U. S. Army Engineer Corps, with the rank of major, serving in the Aleutian

Harold T. Theis

Islands and in Japan. In April 1946 Mr. Theis became associated with Kaiser Metal Products, Inc., as superintendent of maintenance and facilities (plant engineer) and in October 1950 was appointed electrical engineer for the Vitro Corporation of America, which position he held until his appointment as chief electrical engineer of the C.N.J.

Obituary

S. R. Hyett, superintendent of shops of the Great Northern at Superior, Wis., died on November 14.

NEW DEVICES

(Continued from page 88)

Mechanic's Protractor

A handy mechanic's protractor designed for on-the-job measuring of angles up to 180 degrees is made of durable Vinylite plastic rigid sheet that has dimensional stability and is resistant to water, oil, grease and most chemicals. Useful for engineers, carpenters and construction men, inspectors, sheet metal workers, pipe layout men, welders, and many others, the protractor simultaneously gives three readings: for an outside angle, for the adjacent inside angle, and for inches-per-foot against degrees — all with one setting. Spread with edges squarely against sides of an obtuse joint measurement of the adjacent acute angle—angle of bend or de-

flection—is read from the top row of calibration, while measurement of the obtuse angle itself is read simultaneously from the bottom row. Inches-per-foot of pitch is indicated by a second arrow on a separate scale which runs up to 24 inches per foot, for 63 degrees and 26 minutes. To measure certain inaccessible acute angles, a straight edge may be used to extend one side of the angle. Where the protractor itself cannot be used, the angle may be taken with a carpenter's bevel and the angle of the bevel measured with the protractor, using the middle row of calibrations. Readings accurate to a fraction of a degree are facilitated by location of the calibrations at the extreme of the protractor's radius. The Vinylite plastic rigid sheet of which it is made is easily cleaned with a damp cloth. Calibrations cannot wear off because a lamination of Vinylite plastic affords lasting protection. This mechanic's protractor is produced by the Interstate Sales Co., 123 East 18th Street, New York 3.

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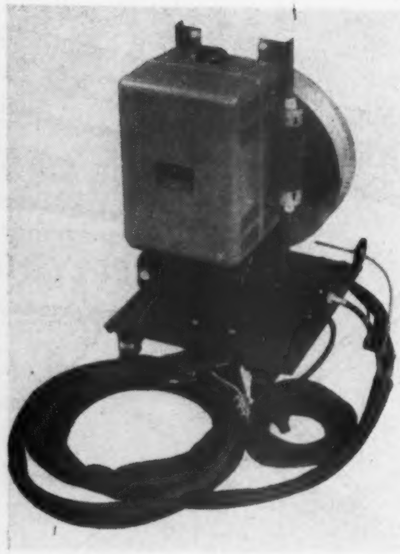
Semi-Automatic Welding Head

Fillerweld, a new product designed to speed alloy-metal welding on applications where filler-metal must be added, has been announced by General Electric's Welding Department.

Used with gas-shielded arc welders, Fillerweld allows the operator to control the continuous flow of filler-metal automatically by means of a finger switch mounted on the torch. Designed for the welding of light gage metals, it allows the operator to start or stop the flow of filler metal without breaking the arc.

The unit consists of the torch or gun, and a mechanical power unit. The gun is basically a manual water-cooled inert-arc tungsten holder to which has been added a control switch, and a gear assembly for pulling the filler-metal from the



spool to the arc through the gun. Rated at 250 amp., the gun accommodates tungsten from 0.040 to 5/32 in. in diameter and up to 7 in. long.

The mechanical power unit consists of a motor which provides the power for drawing the filler-metal, a Thy-mo-trol unit for controlling the motor, and a spool which holds the filler wire. The unit is mounted on a portable platform and can be moved easily from job to job. The process can be applied to best advantage on stock less than 3/16 in. thick. However, where speed is not of paramount consideration, Fillerweld may be used on thicker material.

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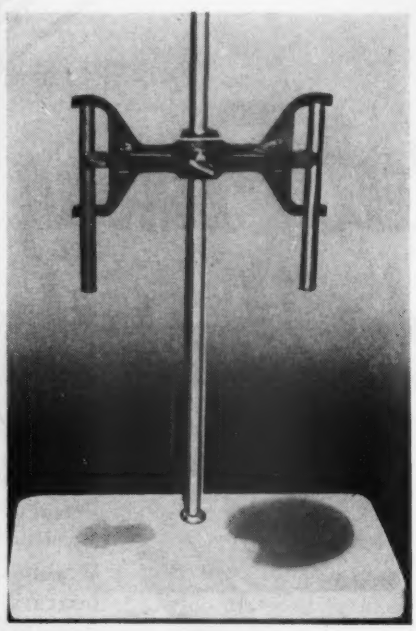

Rustproof Surface For Iron and Steel Parts

Moving parts made of iron and steel can get two-fold protection with a chemical treatment announced by Octagon Process, Inc., Staten Island 1, N. Y. Known as "Rustshield 2," it is a phosphatizing compound which changes steel and iron surfaces to rustproof, highly absorbent nonmetallic areas.

Such a surface, with increased surface area, is an ideal base for the retention of lubricating oils. This surface is a coating produced from chemical inter-action of the phosphate solution and the metal surface.

The solution can be applied to rubbing and sliding surfaces of parts such as thrust washers, pump pistons, gears, valve roller pins, stems and guides, as well as bearing surfaces. Although parts treated in this manner are corrosion resistant, the degree of such resistance can be increased by finishing with a drying oil or wax.

The compound meets the requirements for phosphate coatings in the U. S. Army Ordnance Specification 57-0-2C, Type II, Class A. The process consists of precleaning with vapor degreaser, safety solvent, or alkali cleaner designed for cleaning prior to phosphating. This is followed by rinsing. Rustshielding, rinsing again and treatment with a passivating agent, such as Neutralyte solution.

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Electrical Tape for Preventing Pipe Corrosion

A heavy-duty plastic electrical tape, designed for applications where more-than-average mechanical strength is needed, has been announced by Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Designated Scotch brand electrical tape No. 21, it is recommended for anti-corrosion protection for pipes, cables and equipment laid underground where resistance to cuts and abrasion by rocks during back-fill is important.

It is also recommended for protecting and insulating cable and high tension leads subject to wear, abrasion and rough handling, and for bus bars carrying high voltage.

The tape has a black, vinyl plastic backing that is 20 mils thick; more than twice the thickness of previous tapes of its type. It has a dielectric strength of 22,500 volts, an insulation resistance of 200,000 megohms, and an electrolytic corrosion factor of 1.0. The tape is available in 36-yd. rolls ranging in widths from ¼-in. to 16 in.